SUBSTANCE
PAINTER

DOCUMENTATION

Correct as of June 26, 2018

allegorithmic

Unreferenced

Creating a peeled paint Smart Material

This tutorial is now available on Substance Academy !

Painting Tilling Materials

It is possible to paint tilling materials in Substance Painter by using a specific project setup.
This tutorial will show how to prepare a specific mesh and how to work in Substance Painter with it.

1 - Creating a tilling mesh

> This mesh can also be downloaded, ready to use in your project <

To make the material tile properly, it require a plane with specific UVs.
The size of the mesh doesn't matter, but its divisions are important. The mesh has to be divided in 3 sections on each axis to present a grid of 3 by 3 squares. Creating in total 9 squares.
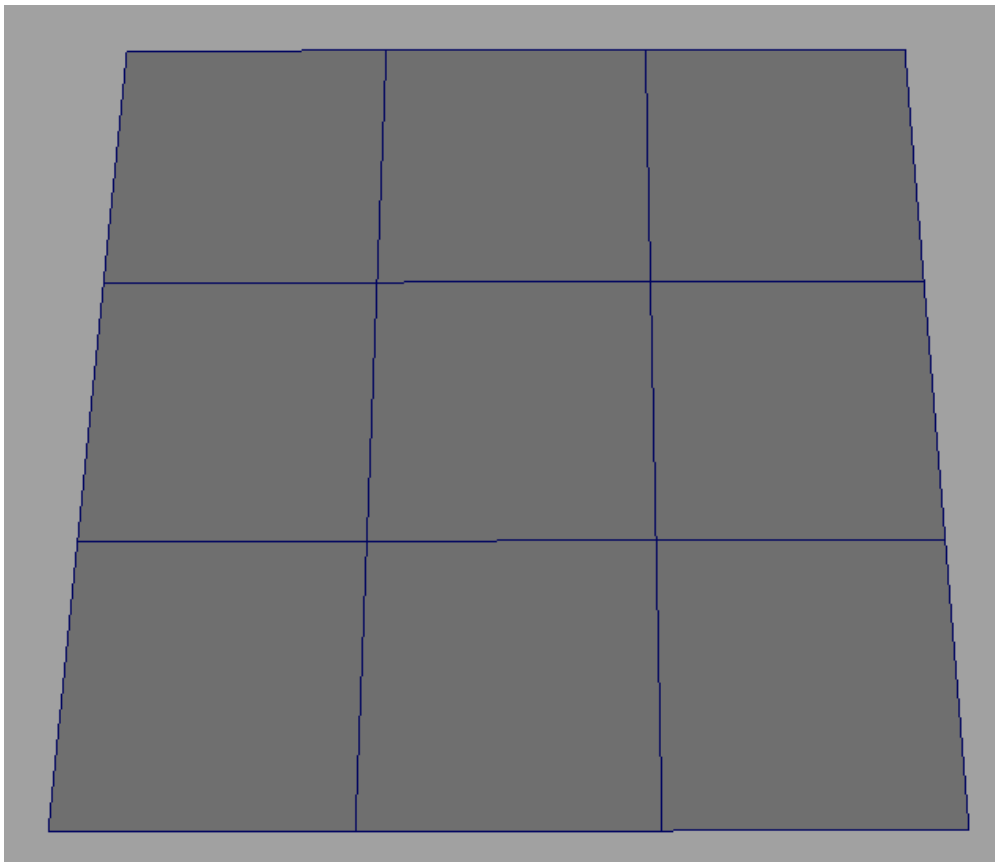
Now each quad of the mesh has to be unwrapped to **fill the whole UV 0-1 range**.
In Maya for example this can be done simply by selecting all the faces and using the "Unitize" function :
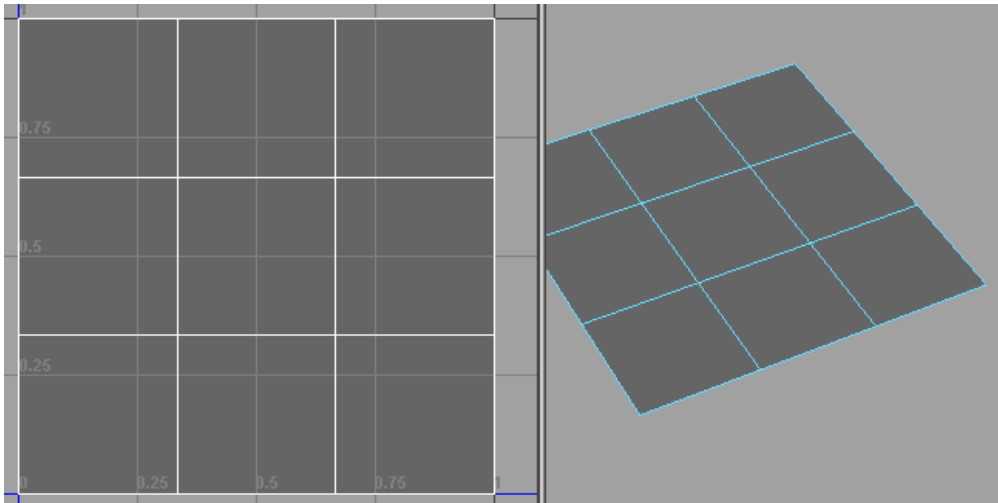
The goal is to have each quad **overlap** each other in the UVs.

Now that the mesh is ready, export it as an **FBX** or an **OBJ** file to import it into Substance Painter.

2 - Creating a project

It is time to create the new project in Substance Painter. Start the software if it's not already the case.

Go to the File menu and choose New :
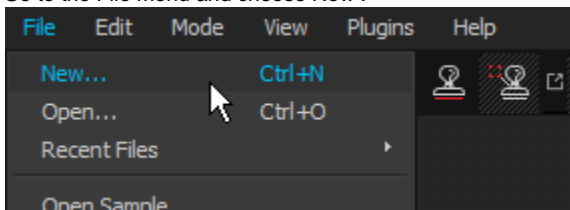
Click on the "select" button in the new window to load the mesh :
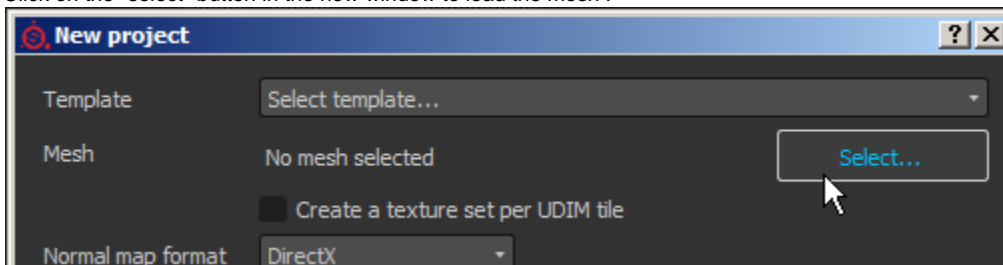
On done, click on "OK" (you can match the settings of the screenshot or use your own) :
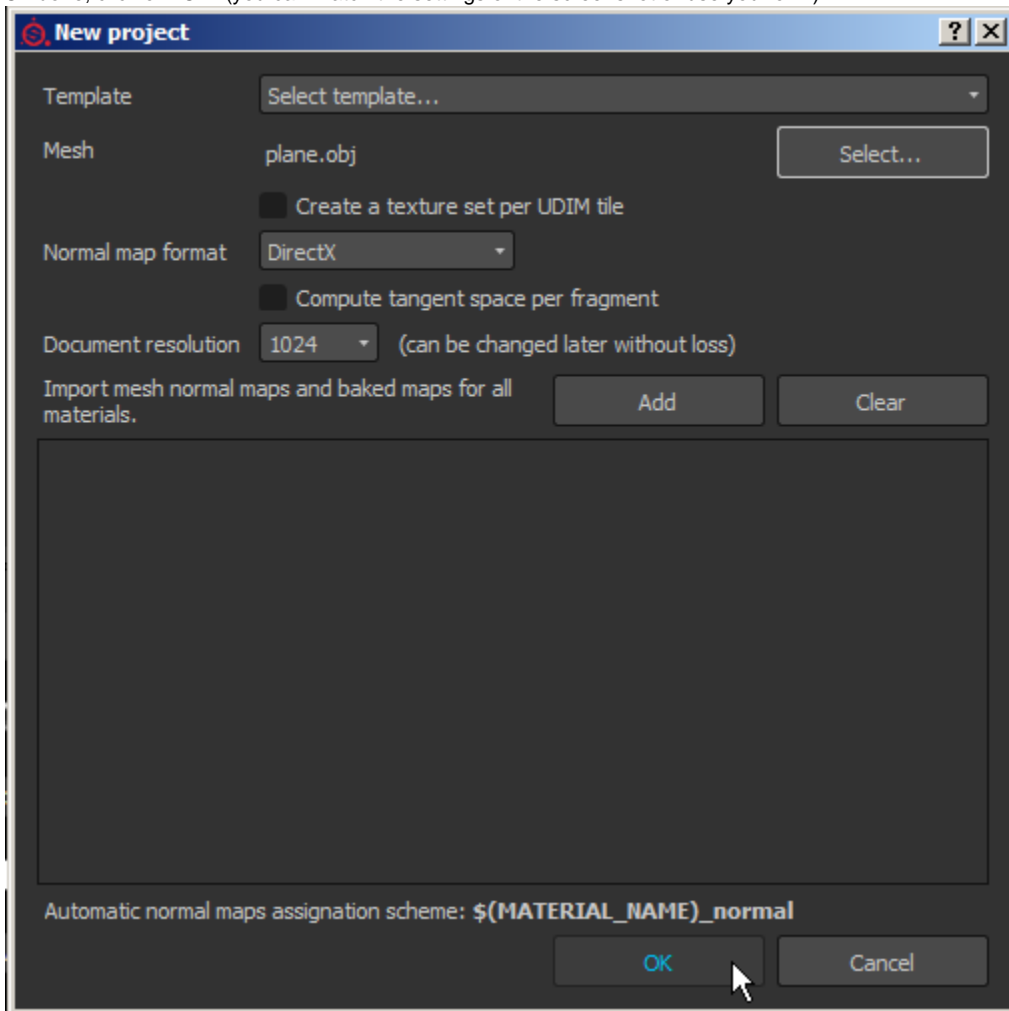
If the viewport seems empty, don't worry !
It's simply because the plane is perfectly perpendicular to the camera and has no height. Simply rotate the camera to make it appear :

3 - Painting without creating seams

The project is ready. Because of the way the mesh is made, it is now possible to paint at any place of the plane and have the brush strokes be repeated, allowing to create seamless textures. This is possible thanks to the overlap of the UVs.
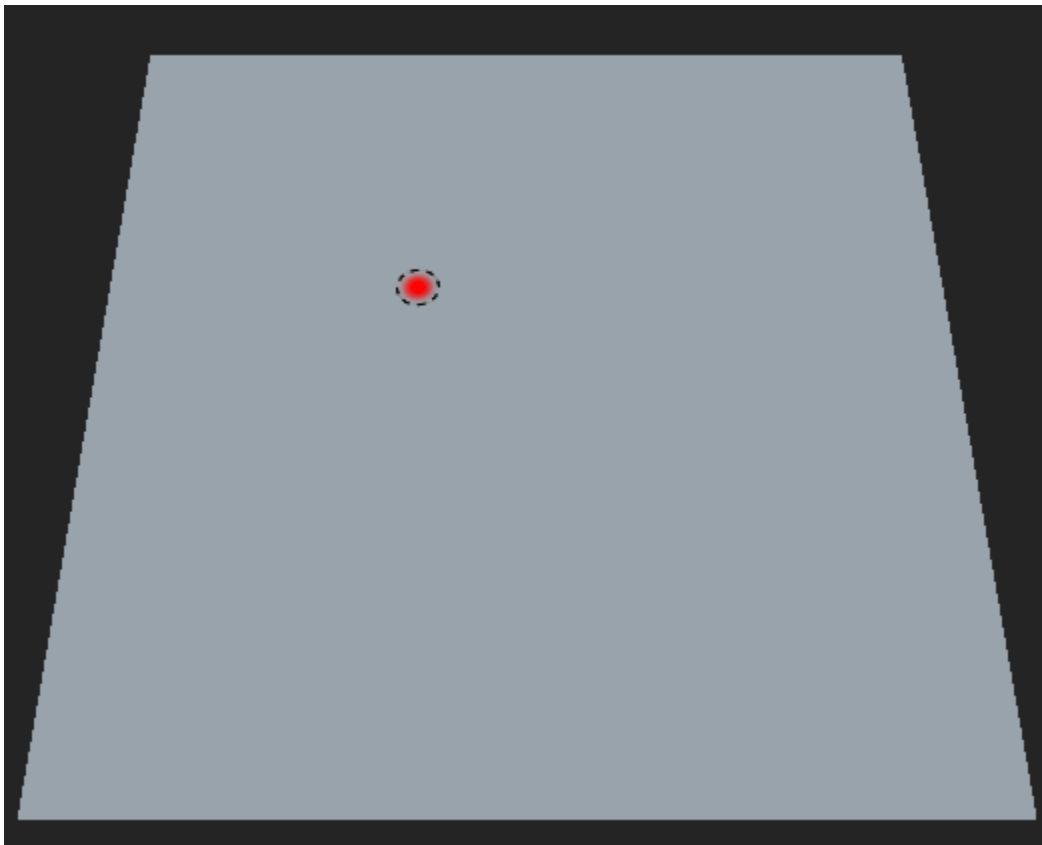
To ensure a seamless texture, be sure to tweak the tilling parameters of the fill layers/fill effects properly to no creak visible seams.
Do not use random rotation for example, keep 90 degrees based angles instead.
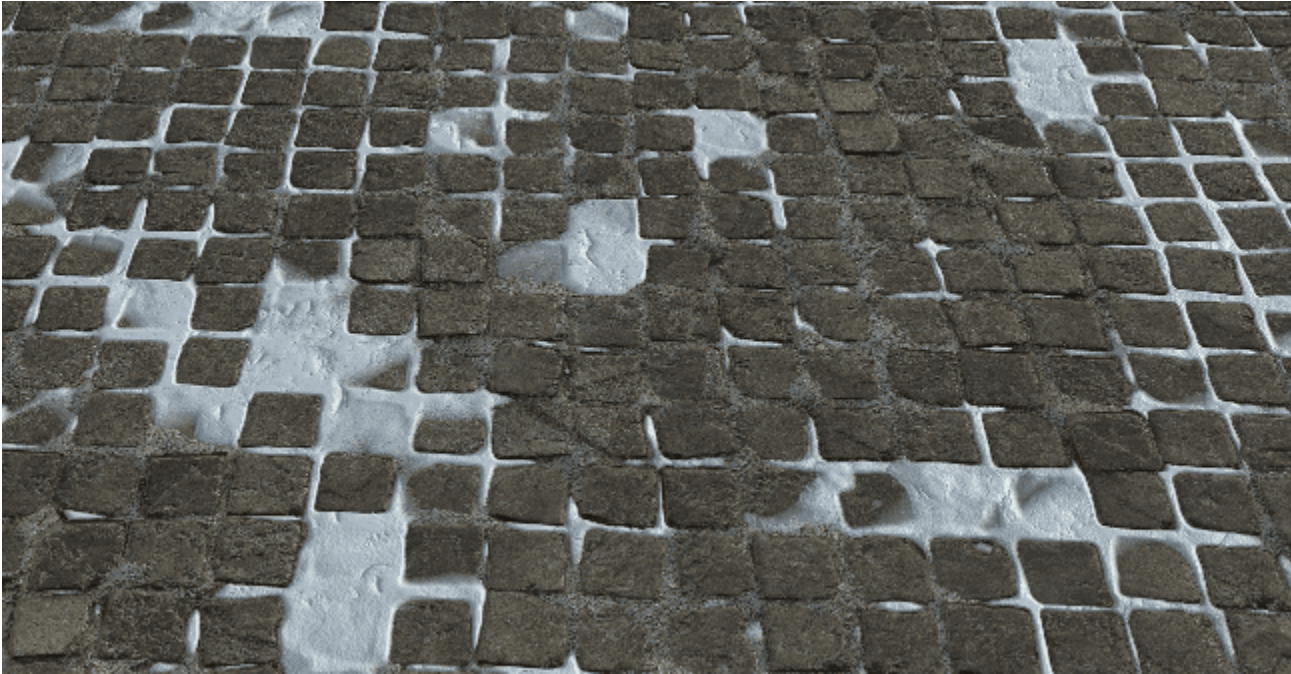
Substance Painter

Substance Painter is a 3D painting software allowing you to texture and render your 3D meshes.
This documentation is designed to help you learn how to use Substance Painter, from basic to advanced techniques.

If you find that any question you have is not answered in this manual please ask on our Forum. You can also download our Physically Base Rendering guide if you wish to learn more about PBR.
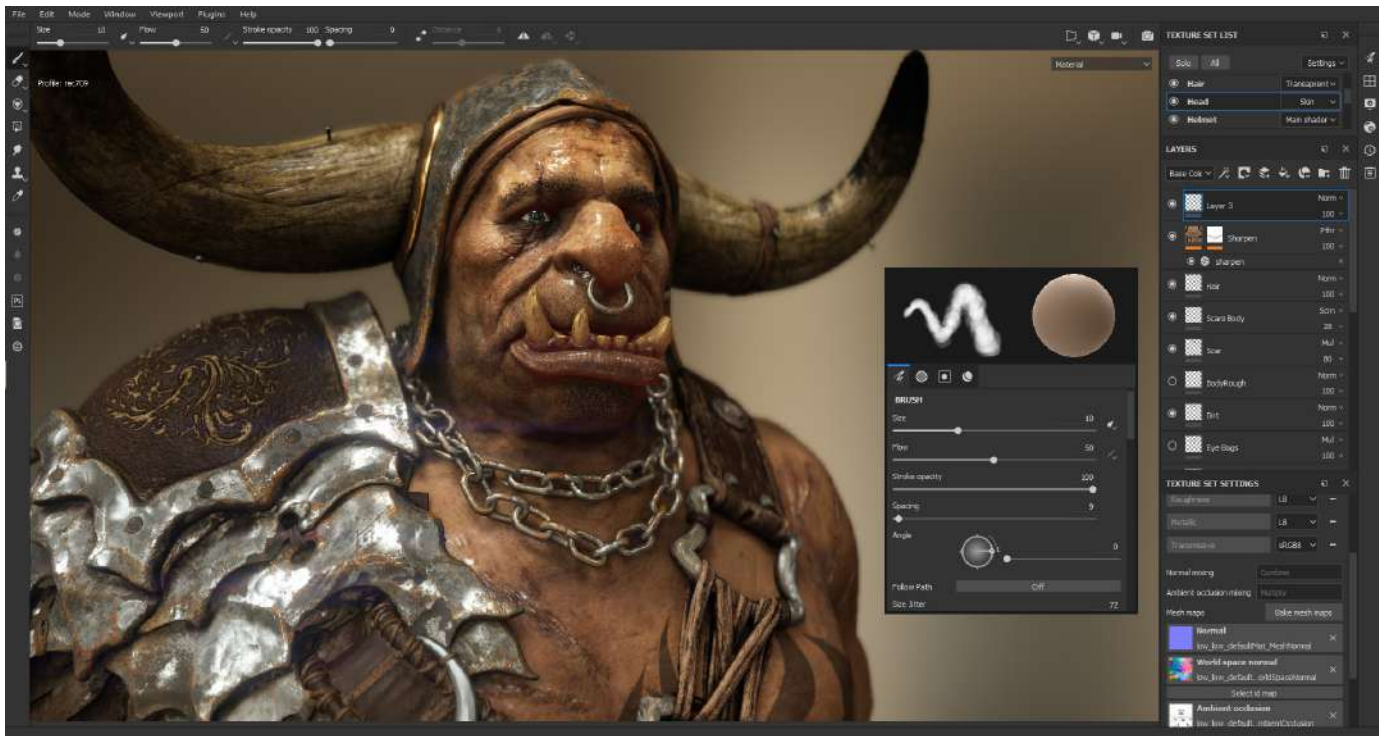
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Getting Started

From the **Welcome screen** of Substance Painter it is possible to access the following pages :

- Tutorials
- Online Documentation (right here 🙂)
- Start Painting: load the "Meet Mat" sample project
- Website
- Forums
- Substance Share

Otherwise, get started with the basics of project creation and export of textures :

- Tutorials
- Project creation
- Project saving
- Export
- License activation
- Glossary
- Performance
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List of shortcuts:

- Shortcuts

Tutorials

General presentation

A general presentation of Substance Painter with new features is given in the following video:

Substance Academy

https://tutorials.allegorithmic.com/

Substance Academy is a place where you can find lots of video tutorials, courses and documentation organized by software, level and topic.
A lot of tutorials for Substance Painter are available at various level. Beginner, intermediate and advanced users can find tutorials over here : http s://tutorials.allegorithmic.com/search?software=substance%20painter

For beginners we recommend:

and the remaining videos can be found at:

https://tutorials.allegorithmic.com/courses/a97b433a5997fd800b5ed300d783cc41/youtube-IGGQl9kVB1M

Community Tutorials

The following tutorials have been made by advanced users of Substance Painter and can be a very good overview of some ways of working with the software:

- **Substance Painter Quickstart**: https://www.youtube.com/playlist?list=PLkzopwqcFevYLqzU5eUZSFzyidouqwSQP
- **Weapon and Robot tutorials**: https://gumroad.com/timb
- **Substance Painter 1 Crash Course**: https://www.youtube.com/watch?v=IhBVsn2tfGc
- **Texturing a gun in Substance Painter with Gametextures**: https://vimeo.com/162135479

Project creation

> Substance Painter will create a new Texture set per Material definition on the mesh you are importing.
> This means you can import multiple meshes from a single file with overlapping UVs if you give them different materials.

Creating a new project

Click on **File > New** to create a new Substance Painter project.

You will be prompted with the following window:
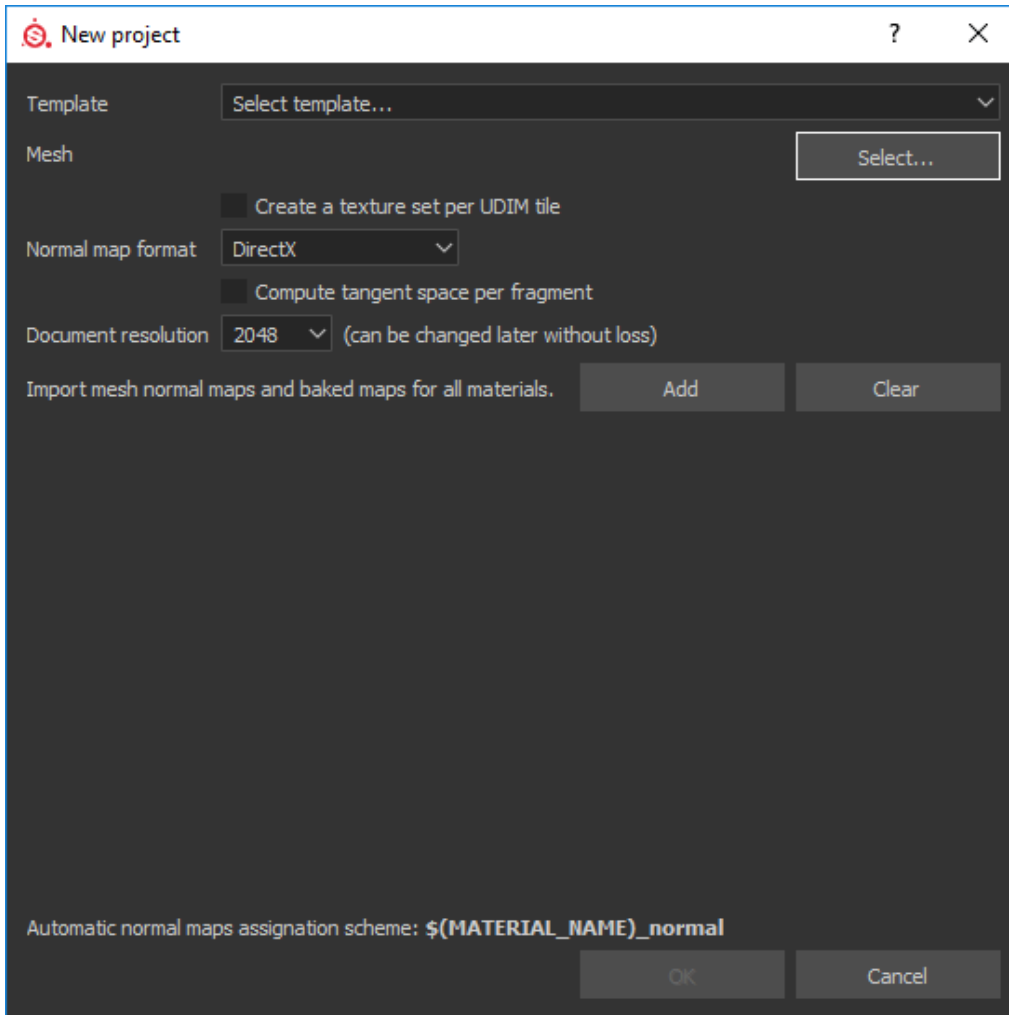
- **Template**: Allow to specify a template that will define the default settings of the project (texture set settings, shader and baker settings).
- **Mesh**: Choose here the mesh you want to paint over.
- **Create a Texture Set per UDIM tile**: this setting will convert UDIM tile (UV ranges) as individual texture set, ignoring materials. See the UDIM page for more information.
- **Normal map format**: choose here the normal map format for the project, either **DirectX** (X+, Y-, Z+) or **OpenGL** (X+, Y+, Z+).
  Example: The Unreal Engine use DirectX, while Unity use OpenGL.
- **Compute tangent space per fragment**: If enabled, the tangent and binormals of the mesh will be computed in the pixel shader.
  Unity requires this setting to be disabled while the Unreal Engine 4 requires this setting to be enabled.
- **Document resolution**: choose the default resolution of the document. The resolution can go up to 4k and can be changed at anytime later on.
- **Mesh normal maps and baked maps**: Add all the maps related to the mesh that you will need for texturing. This should be the high poly normal map, curvature map, ambient occlusion map, etc.

Follow this scheme to have your maps automatically assigned : **TextureSetName_AdditionalMapSlot**

Naming convention for Additional maps:

- Ambient occlusion = *ambient_occlusion*
- Curvature = *curvature*
- Normal = *normal_base*
- World Space Normal = *world_space_normals*
- ID = id

- Position = *position*
- Thickness = *thickness*

Example : **DefaultMaterial_ambient_occlusion.png**

You can bake the Additional maps directly in Substance Painter or Substance Designer.

Project saving

Substance Painter has two modes for saving a project:

- Incremental: faster and not resulting in an optimal file size.
- Full (Compact): slower and resulting in an optimal file size. It corresponds to a defragmentation and a removal of useless files of the project.

Most of the times, the save is incremental unless a clean is done and the next save is in Full mode. The aim is to speed up the saving process.

Save & Compact

Click on **File > Save And Compact** to save the Substance Painter project in Full (Compact) mode and reduce the size of the project.
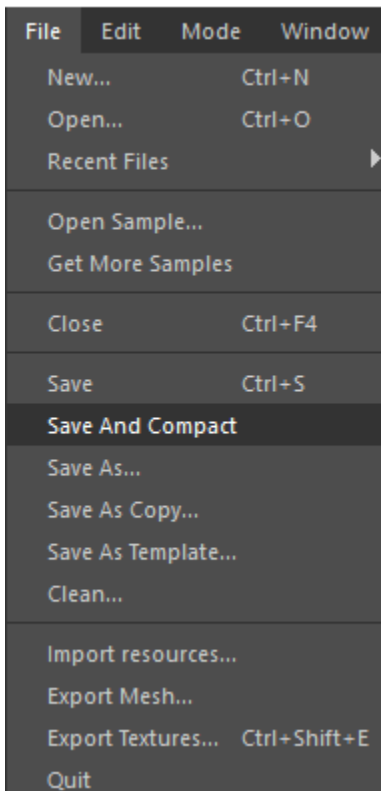
Export

Substance Painter exports the result of a project as **bitmap textures**.
Those textures files are created from each channel present in each Texture Set of the project. They can be mixed based on a specific preset.
Multiple presets are shipped by default, but it is also possible to create new ones.

See the following pages for more information:

- Exporting textures
- Creating export presets
- Padding
- External Rendering Setup

Exporting textures

Once a project is ready, go to the **File** menu and choose **Export Textures** to open the export window. This new window will allow to export the content of a project as **image files**.

> See the bottom of the page for explanations about the potential warnings that Substance Painter may indicate during the export process.

Two tabs are available in this window:

- **Export**: Setup for each texture set and export the project as textures
- **Configuration**: Setup for export presets. For more information see the dedicated page : Creating export presets
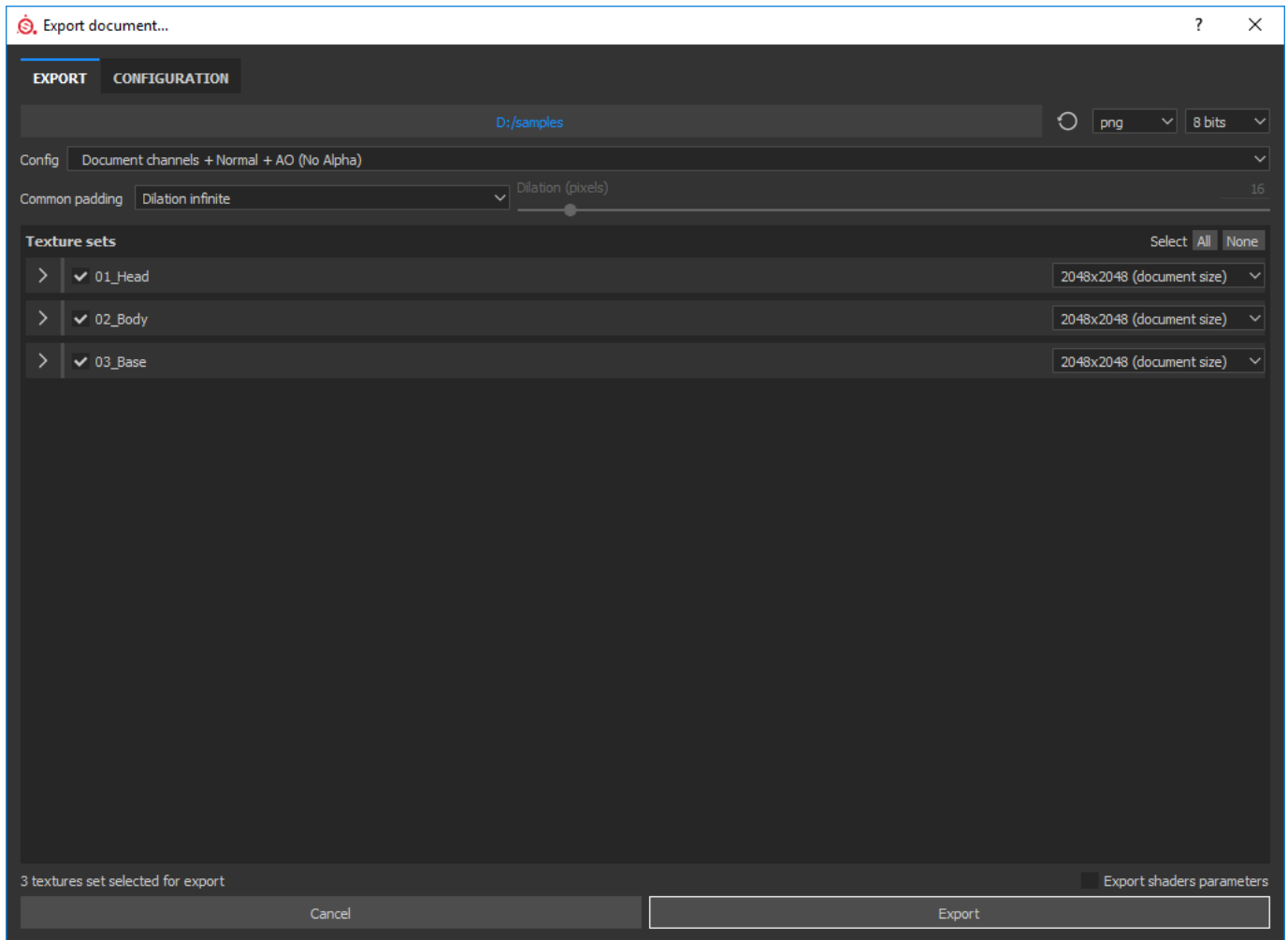
Export path
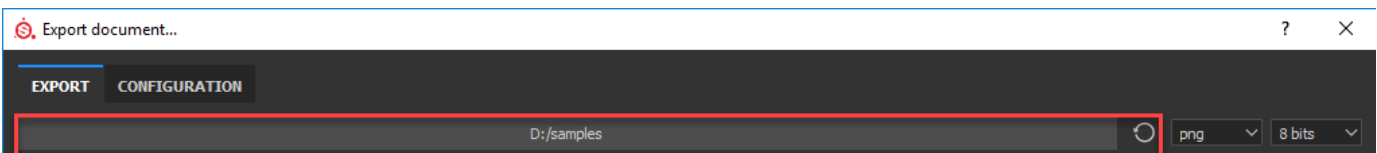
The default export path for any new project is located in the "Documents" folder.

- This path can be overridden by clicking on it and specifying a new location.
- **This path is saved per project**.
- The little arrow on the right can be used to reset the path back to the default location.

> If the export path is relative to the project, it will be saved as relative, even if the interface still display an absolute path.
> **Example**:
> - Project: C:/Project/test.spp
> - Export: C:/Project/Export/
> - Saved Path: /Export/

File format & Bit Depth
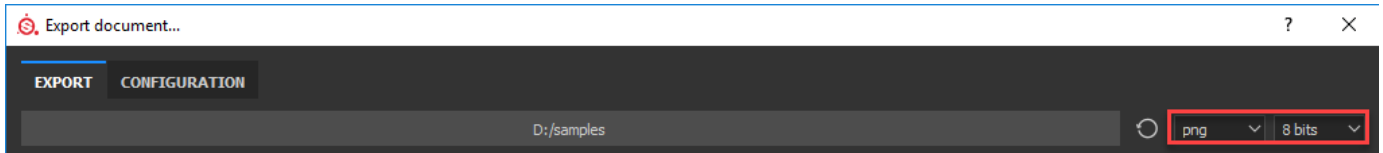
Substance Painter exports to a wide range of file formats. Currently supported formats are:

BMP	PGM	WBMP	J2K
ICO	PPM	XPM	JPEG-2000
JPEG	PNG	GIF	PFM
JNG	TARGA	HDR	PSD
PBM	TIFF	EXR	

Depending of the file format, the bit depth can be changed. A higher bit depth will provide a better quality of texture.
However some applicaiton don't support high bit depth, so a lower value will be required.

> In case of the **PSD** (Photoshop) file format, each texture set from a project is exported as a single psd file containing the exported textures associated to the texture set.

Export Presets
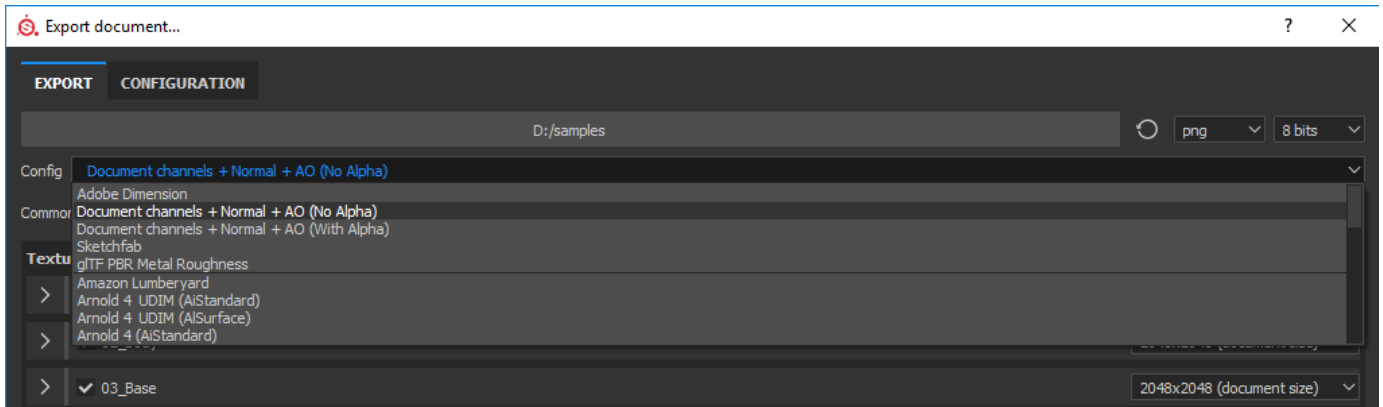
When exporting from Substance Painter a preset can be chosen to pack and name the output textures in a specific configuration.

Preset list (non-editable) :

Preset	Description
Adobe Standard Material	Export an OBJ file, PBR Metallic Roughness textures and an MDL file. Ready to be used in Adobe Dimension.
Document channels + Normal + AO (No Alpha)	Export each of the channels individually but also the converted normal map and final Ambient Occlusion, without any packing. The alpha of the channel is replaced by a default color.
Document channels + Normal + AO (With Alpha)	Export each of the channels individually but also the converted normal map and final Ambient Occlusion, without any packing. The alpha of the channel is preserved.
Sketchfab	Export the textures and the mesh to Sketchfab.
glTF PBR Metal Roughness	Export PBR Metallic Roughness textures and a mesh file to be used in software supporting the glTF file format.

Preset list (editable) :

Preset	Description
Amazon Lumberyard	Name and pack textures to be imported and used in Amazon Lumberyard.
Anorld 4 UDIM (AiStandard)	Preset for Anorld 4 renderer (UDIM naming convention).
Anorld 4 UDIM (AiSurface)	Preset for Anorld 4 renderer (UDIM naming convention).
Anorld 4 (AiStandard)	Preset for Anorld 4 renderer (for AiStandard shader).
Anorld 4 (AiSurface)	Preset for Anorld 4 renderer (for AiSurface shader).
Arnold 5 (AiStandard)	Preset for Anorld 5 (AiStandard shader)
Arnold 5 UDIM (AiStandard)	Preset for Anorld 5 (UDIM naming convention).
Corona	Preset for Corona renderer.
CryEngine 3	Name and pack textures to be imported and used in Cry Engine 3.
Dota 2	Preset for the game Dota 2 (can be used with the associated template).
Keyshot	Preset for Keyshot renderer.
Lens Studio	Preset for Lens Studio (to create then an asset for Snapchat)
Mesh Maps	Export additional map slots of a texture set individually (exported at the same resolution as for the texture set).
PBR MetalRough	Name and export textures needed for a regular Metallic/Roughness PBR workflow
PBR MetalRough (Folder or PSD Groups)	Similar to PBR MetalRough, but creates an additional folder. This preset is mostly suited to be used with the PSD file format.
PBR SpecGloss	Name and export textures needed for a regular Specular/Glossiness PBR workflow. (The textures are converted from the BaseColor/Metallic workflow).
PBR SpecGloss from MetalRough	Convert Basecolor, Metallic and Roughness channels to be compatible with the Specular/Glissiness workflow.
Redshift	Preset for Redshift renderer.
SpecGloss (non PBR)	Preset for non-PBR renderers/game engines (to be used with the associated shader).
Shade 3D	
Unity 4	Name and pack textures to match to match Unity 4 shaders. (The textures are converted from the BaseColor/Metallic workflow).
Unity 5 (Standard Metallic)	Name and pack textures to match the standard Unity 5 shader.
Unity 5 (Standard Specular)	Name and pack texture to match the standard specular Unity 5 shader. (The textures are converted from the BaseColor/Metallic workflow).
Unreal Engine 4 (Packed)	Name and pack textures to be used in the Unreal Engine 4 engine with the less memory footprint possible.
Vray	Preset for Vray renderer.
Vray UDIM	Preset for Vray renderer (UDIM naming convention).

Octane is also supported. For more information see External Rendering Setup.

For creating a custom preset, see the dedicated page : Creating export presets.

Padding settings
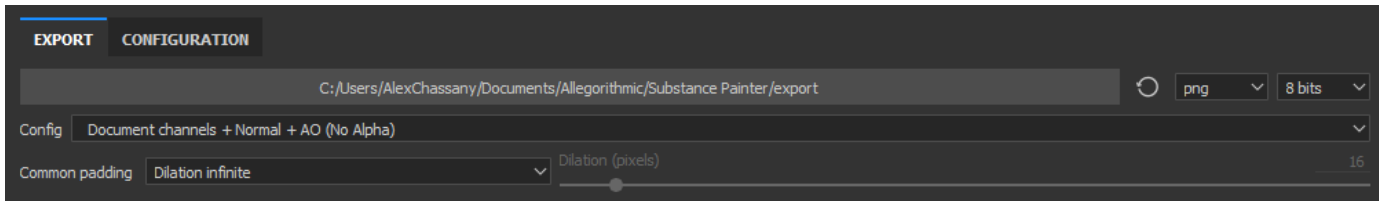
The common padding settings allow to specify how the outside of the UVs will be filled. This setting is global to all the Texture Sets (unless overidden, see below).

Setting	Description
No padding (Passthrough)	No information will be generated outside the UV islands, so the result could result in incorrect texturing, memory garbage or remaining pixels after blending operations.
Dilation infinite	Default setting. Padding is generated until it reaches the borders of the texture.
Dilation + Transparent	Padding is generated to a maximum distance defined in pixels (with the slider on the right). The remaining area will be transparent.
Dilation + Default background color	Padding is generated to a maximum distance defined in pixels (with the slider on the right). The remaining area will replaced with the default color of the channel.
Dilation + Difusion	Padding is generated to a maximum distance defined in pixels (with the slider on the right). The remaining area will replaced difussion (blurry version of the UV islands).

> For more information on how and why padding is necessary, see the dedicated page : Padding

Texture sets and resolution

In the center of the export window you can see the list of texture sets available from the currently opened project.
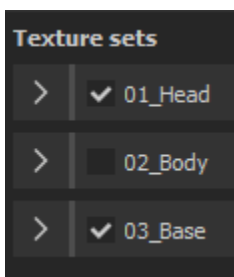
On the leftm inside the list it is possible to disable the export of a specific texture set by simply unchecking the box next to its name.
It is possible to quickly select/unselect all the texture sets by using the "**All**" or "**None**" button.
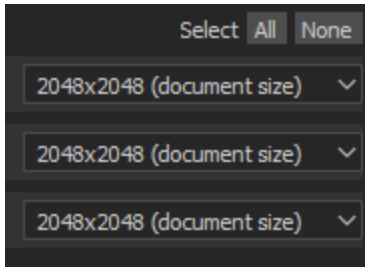
On the right, a drop down list displays the output size (or resolution) of the textures of the texture set.
It is possible to export at a different size than what the project is currently set, even a higher resolution. The mention "document size" indicates that the output size is identical to what is set in the texture set settings window.

> When exporting at higher resolution, Substance Painter will **recompute** all the **brush strokes and operations** of the project to export a real texture, and **not an upscaled version**.
> When exporting at a lower resolution Substance Painter performs a downscale with bilinear filtering.

> The experimental 8192 (8K) texture resolution is only available if the current GPU used by Substance Painter has more than 2GB of VRam.
> Because of the amount of Ram, VRam and processing power required, this resolution is only available in the export window.

The little arrow on the left of a Texture set name allows to expand the view and display more details :

- The list of the list show the **final textures names** generated from the selected Export Preset.
- On the right it is possible to **override the padding settings** for this specific Texture Set.

Export of the textures

When ready, hitting the "export" button will start the export process.

During the export processm the following windows is displayed:
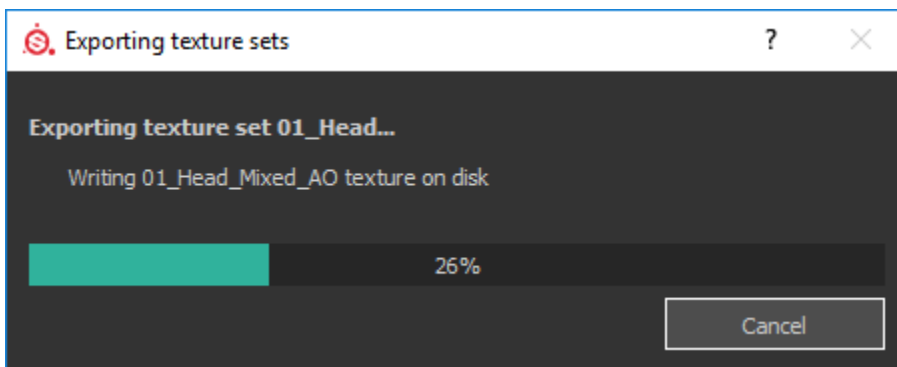
The export can be cancelled at any time. A progress bar is displayed with a message indicating which texture map is being processed.

Another pop-up window will appear at the end of the process.
It is possible to cancel the export by hitting the "cancel" button. This will close the window without saving any changes that could have been made to the textures during the saving process.

> The "**export shaders parameters**" checkbox allows to output shader parameters as a Json file. This is useful when working with the Dynamic Material Layering workflow.

If the export was successful, the following pop-up will appear:
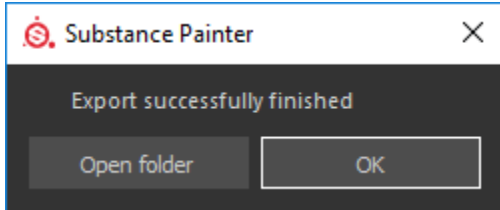
- The **Open folder** button will open a new window (depending on the operating system) where the exported textures are located.
- The **OK** button will close the export window and will give back the focus to Substance Painter.

If errors appear during the export, see the section below for full details.

Warnings

Some errors can occurs during the export, depending of the preset used and the texture set configuration.

"Export finished with some warnings (see logs)"

This warning indicates that some channels needed by the export preset were not available in one of the texture sets.
The log window should give full details about which channel, for example:

- *[MapExporter] The input map 'Displacement' needed by the map 'Preset_BaseColor' of the texture set 'Cymourai' isn't available because: 'Displacement' channel is missing in your texture set.*

"Error during the export (see logs)"

This warning indicates that none of the textures defined in the selected export preset have been exported because all the required channels are missing from the texture set.
The error in the log should look like this:

- *[MapExporter] None of the required document map are available in the cymourai textureSet. Nothing could have been exported.*

Creating export presets

Substance Painter allows you to create custom export presets for naming and configuring the textures to be exported.
Some default presets are already included in Substance Painter, but it is possible to create new presets.

The configuration tab of the export window is divided into three main parts:

- Left: the **Preset list**, which allows you to choose which preset to edit as well as duplicate and rename.
- Middle: the **Output texture list**, which lists the content of a selected preset and displays the naming convention and the channel packing options.
- Right: the **list of Channels** and **Converted textures** available from Substance Painter, which can be used in an output texture.
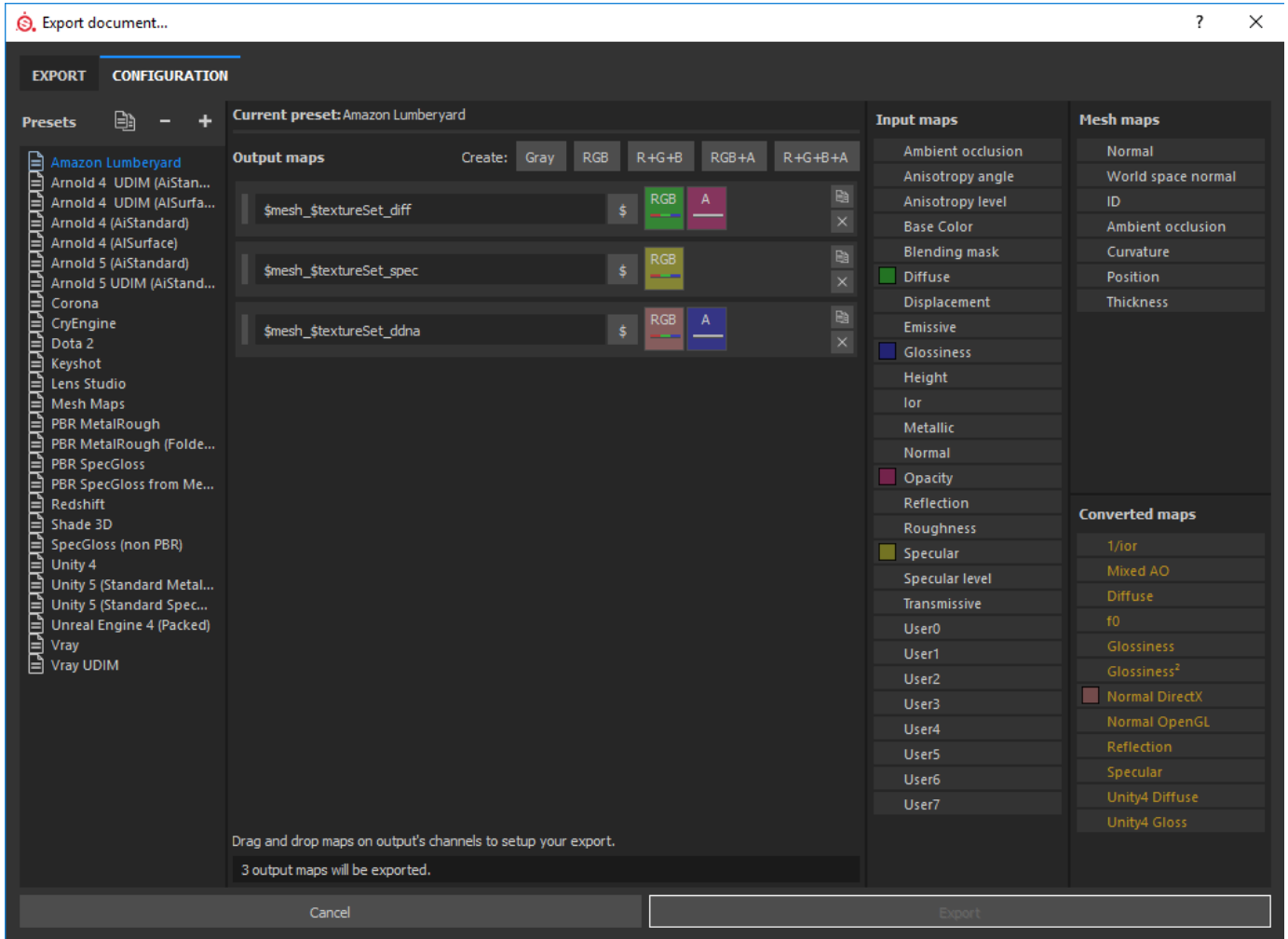
Presets are saved on the disk as **individual files** and can be shared with any other user of Substance Painter.
These presets are located in the shelf under the folder "**export-presets**", which is located here:

- **Windows**: C:\Users*username*\Documents\Substance Painter\shelf\export-presets
- **Mac OS**: Macintosh > Users > *username* > Documents > Substance Painter > shelf > export-presets

When a preset is used to export textures, the preset file is automatically included in the resources of the project.
This allows the sharing and/or moving of a project to an other computer while maintaining the presets for exporting the textures.
Only the last used preset is saved in the project. However if Substance Painter detects a preset that has the same name, the preset inside the project the will be marked as "Outdated" in the list.

Creating a preset

On the top of the preset list, there are three buttons:

- **Duplicate**: duplicate an existing preset.
- **Remove**: delete any selected preset.
- **Create**: create a new and empty preset.

You can also double-click on a preset or right-click > rename to change the name of a preset.

Creating output maps

Once a preset is selected, it is possible to add new output maps using the dedicated buttons, which are available on the top/middle section of the window.
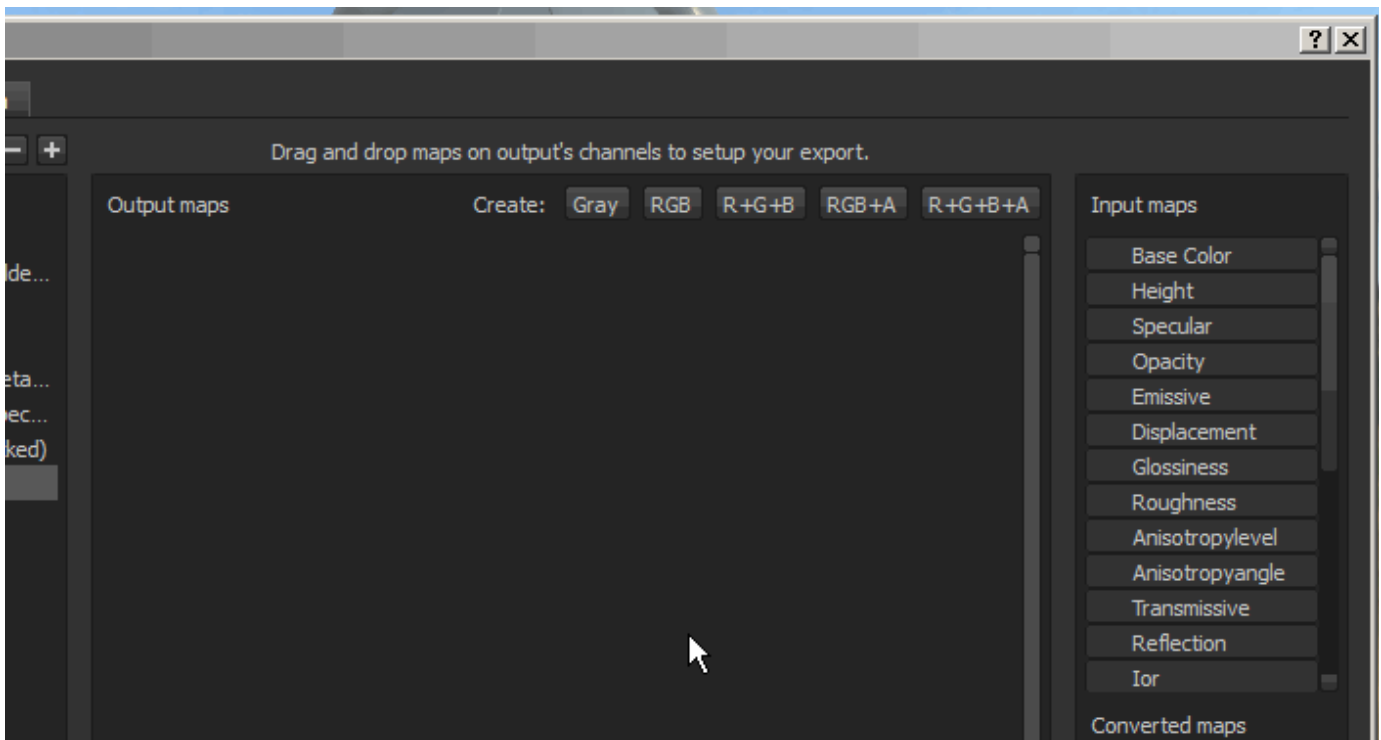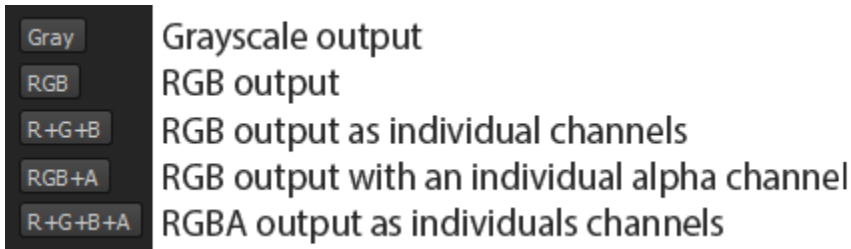
Once a map has been created, it is possible to name it and then drag and drop an input maps into one of the available channel slots.
During the drop, a menu will open asking which type of content is to be loaded in that slot.

The options range from **RGB** and **individual** channels, to the **Alpha** and the **Grayscale** conversion of the input.

Each time an input map is dragged and dropped, a random color will be generated. This provides a visual cue for the channels and the corresponding input map that is loaded.
The button will also indicate what is loaded into the slot:

- Background color: indicates which **input** maps are loaded.
- RGB bar: indicate that the **R**, **G** and **B** channels from the input map is loaded.
- Red bar: indicate that the **red** channel from the input map is loaded.
- Green bar : indicate that the **green** channel from the input map is loaded.
- Blue bar: indicate that the **blue** channel from the input map is loaded.
- Gray bar: indicate that the input map is loaded as a **grayscale** (either from an RGB to Grayscale conversion or because the input is already in grayscale).
- Black/White line: indicate that the **alpha** channel from the input map is loaded. In Substance Painter the alpha from an input correspond to the total area painted.

Naming output maps
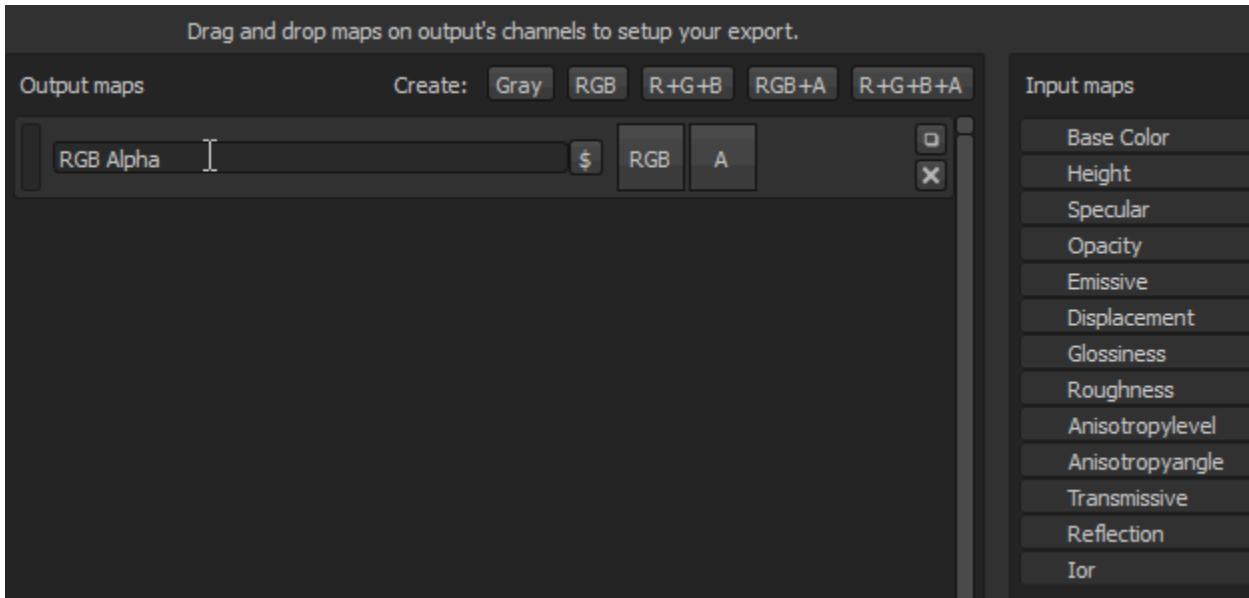
Some flags are available to automatically generate the name of the texture during the export process.

- **$mesh**: name of the mesh file that was loaded in the project
- **$textureSet**: name of the texture set
- **/** (forward slash): folder separation

Example: cymourai.fbx with a texture set named "MaterialBase"
 - $mesh_$textureSet_BaseColor will generate **cymourai_MaterialBase_BaseColor.png.**
 - $mesh/$textureSet_BaseColor will generate a folder named **cymourai** with a texture named **MaterialBase_BaseColor.png** inside of it.

> Folders are automatically converted as groups in case the export format is set as **PSD** (Photoshop) file format.

Assigning channels to output maps
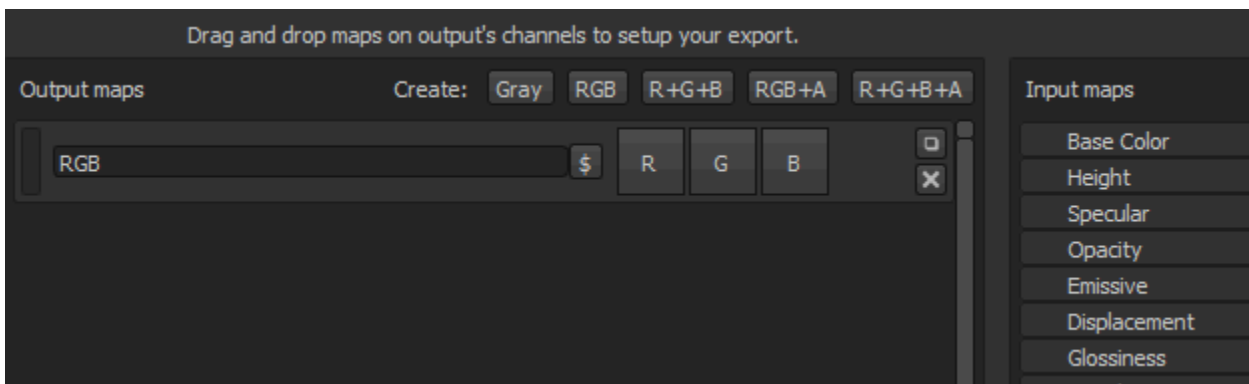
It is possible to leave some channels (of the output map) totally empty. In this case case a default color will be assigned.

> If a slot refers to a channel that is not present in the Texture set during the export, a default color will also be generated.
> This color changes depending on the channel which gives the best neutral value.
> **Example** : If missing, the height channel will be generated with a default gray value.

There are two types of maps:

- **Input maps**: direct channels that can be added in a texture set. Via the TextureSet settings panel.
- **Mesh maps**: Textures present in the additional map slots of a Texture Set (baked textures).
- **Converted maps:** virtual textures, those textures are generated during the export based on the channels present in the document.
  - <u>Normal OpenGL/DirectX</u>: Outputs a normal in the dedicated space by combining the normal from the additional maps, the height and the normal channel.
  - <u>Mixel AO</u>: Combine the Ambient Occlusion addiitonal map with the Ambient Occlusion channel.
  - <u>Diffuse</u>: Diffuse color generated from the BaseColor and Metallic channels (metallic parts will be replaced with a black color).
  - <u>Specular</u>: Specular color generated from the BaseColor and Metallic channels.
  - <u>Glossiness</u>: Inverse of the roughness channel.
  - <u>Unity4 Diffuse</u>: Diffuse color generated from the BaseColor to match Unity4 shaders.
  - <u>Unity4 Gloss</u>: Glossiness generated from the Roughness and Metallic channel to match Unity4 shaders.
  - <u>Reflection</u>: Export a map where white indicate a dielectric materials and other colors for metallic materials
  - <u>1/ior</u>: 1 divided by the ior value, ior is generated from the metallic map : 1.4 for dielectrics, 100 for metals (black color)
  - <u>Glossiness²</u>: Square version of the glossiness channel (Glossiness * Glossiness)
  - <u>f0</u>: Reflectance value at fresnel 0 (0.04 for dielectrics, 1.0 for metallic)

Padding

Padding generation

The **padding** (also called dilation) is a process that happens during the export of textures from Substance Painter. Its purpose is to dilate the borders of the UVs to fill empty areas with similar pixels. Generating a good quality padding is important to ensure good mipmaps generation later by game engines (such as Unity or Unreal Engine). Substance Painter can generate an infinite padding. This means it will stretch a pixel until it reach an other UV island or the borders of the texture. You can achieve the same effect manually in Substance Designer via the Distance node.

MipMaps

In 3D computer graphics, **mipmaps** are pre-calculated, optimized sequences of textures, each of which is a progressively lower resolution representation of the same image. They are intended to increase rendering speed and reduce aliasing artifacts. A high-resolution mipmap image is used for objects close to the camera. Lower-resolution images are used as the object appears farther away. This is an efficient way of rendering instead or reading all the pixels from the original texture. The mipmaps (each level) are embedded inside the texture itself.

Padding is very important for mipmaps as it avoids incorrect colors to bleed inside the UVs of the mesh when going to lower texture resolutions.

On the examples above, you can see the gray background bleeding into the UVs in the example at right, while with padding in the example at left keeps the color consistent.

Inside a 3D application this is the result :

With Padding

You can select which padding to use on a per-Texture Set basis: UV Space Neighbor padding or 3D Space Neighbor padding in Texture Set Settings:

.
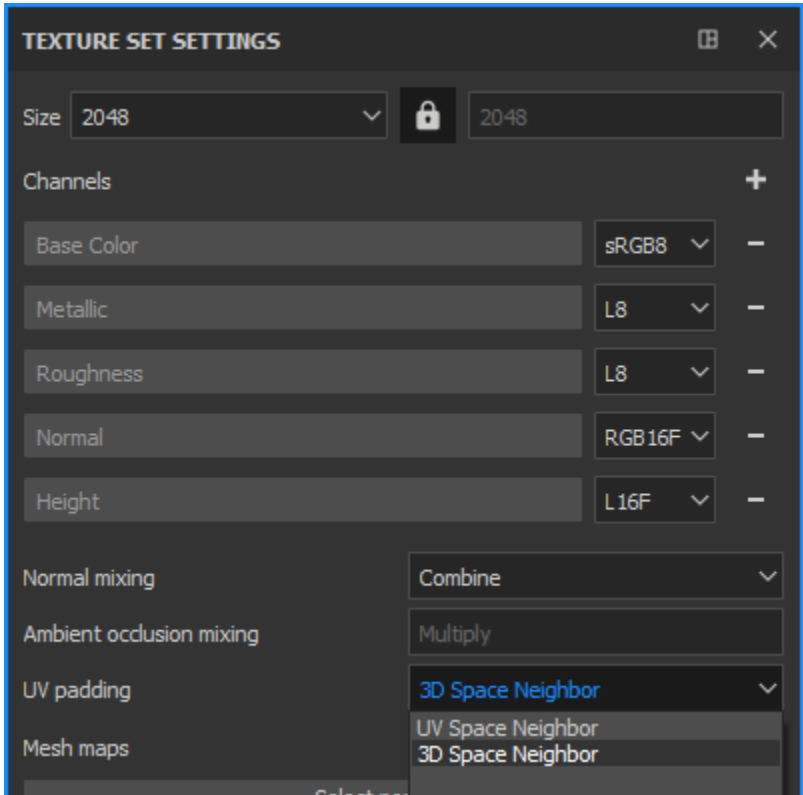
External Rendering Setup

- Arnold for Maya
- Keyshot
- Marmoset Toolbag 2
- Mental Ray for Maya
- MODO
- Octane
- Redshift for Maya
- Unity 5
- Unreal Engine 4
- V-Ray for Maya

Arnold for Maya
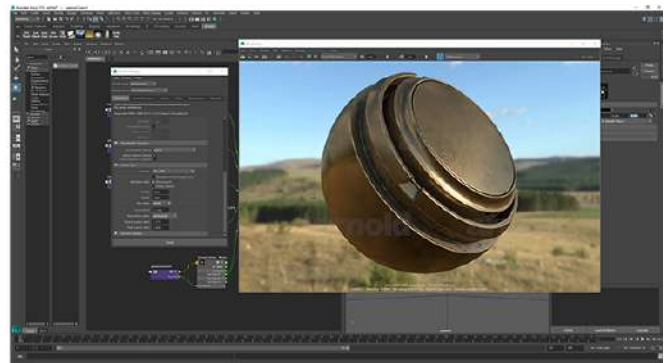
Arnold for Maya, MtoA 1.2.6.1

Arnold uses a Diffuse, Specular, Roughness workflow ; consequently textures made in Substance Painter using the BaseColor, Metallic workflow have to be converted for the Arnold shader. Arnold being a raytracer and Substance Painter viewport being OepnGL, the result between the two might be slightly different.

Substance Painter Export

1. In your Project go to File / Export Textures...

2. In the Export Tab, select the Arnold Configuration and Click on Export
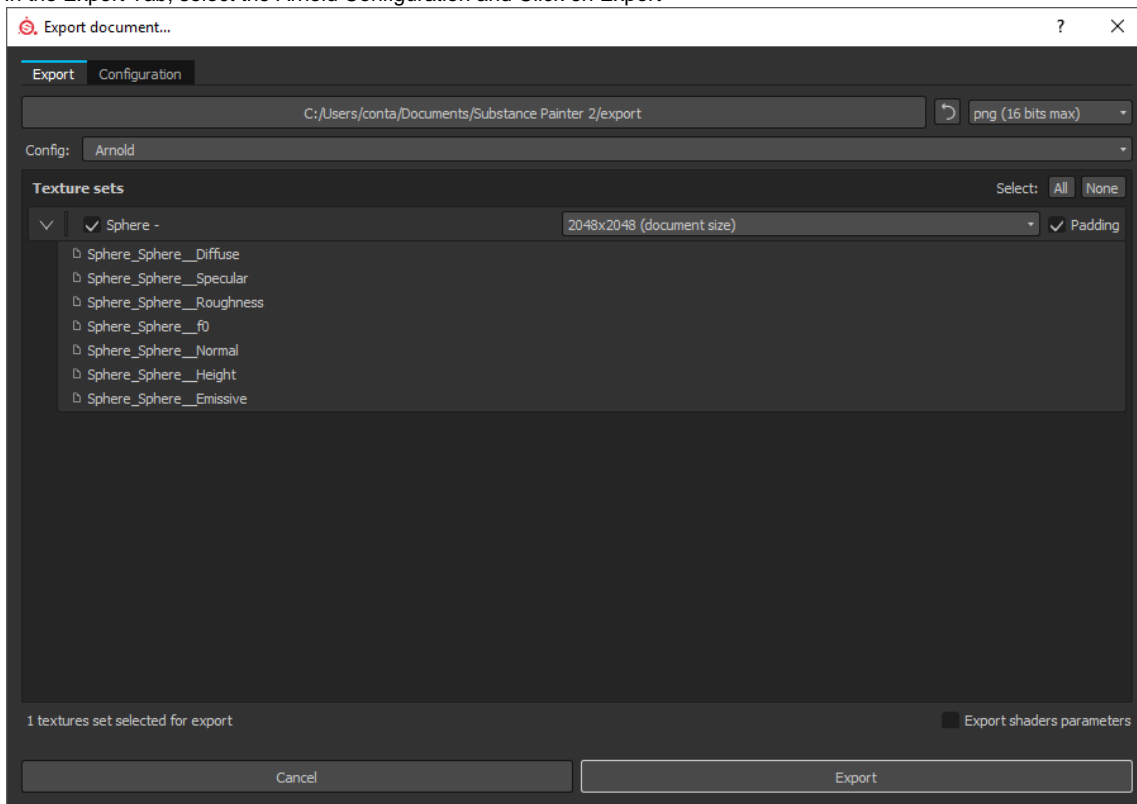
Arnold Standart Shader

- Arnold Standart Shader settings:
  - the diffuse texture is plugged to the **Diffuse** channel
  - the specular texture is plugged to the **Specular** channel (not the reflection channel!)
  - the **Specular Weight** is set to 1.0
  - the Roughness texture is plugged to the **Roughness** channel
  - the Microfacet Distribution is set to **ggx**
  - the **Fresnel** option is enabled

- the f0 texture is plugged to the **Reflectance at Normal** channel
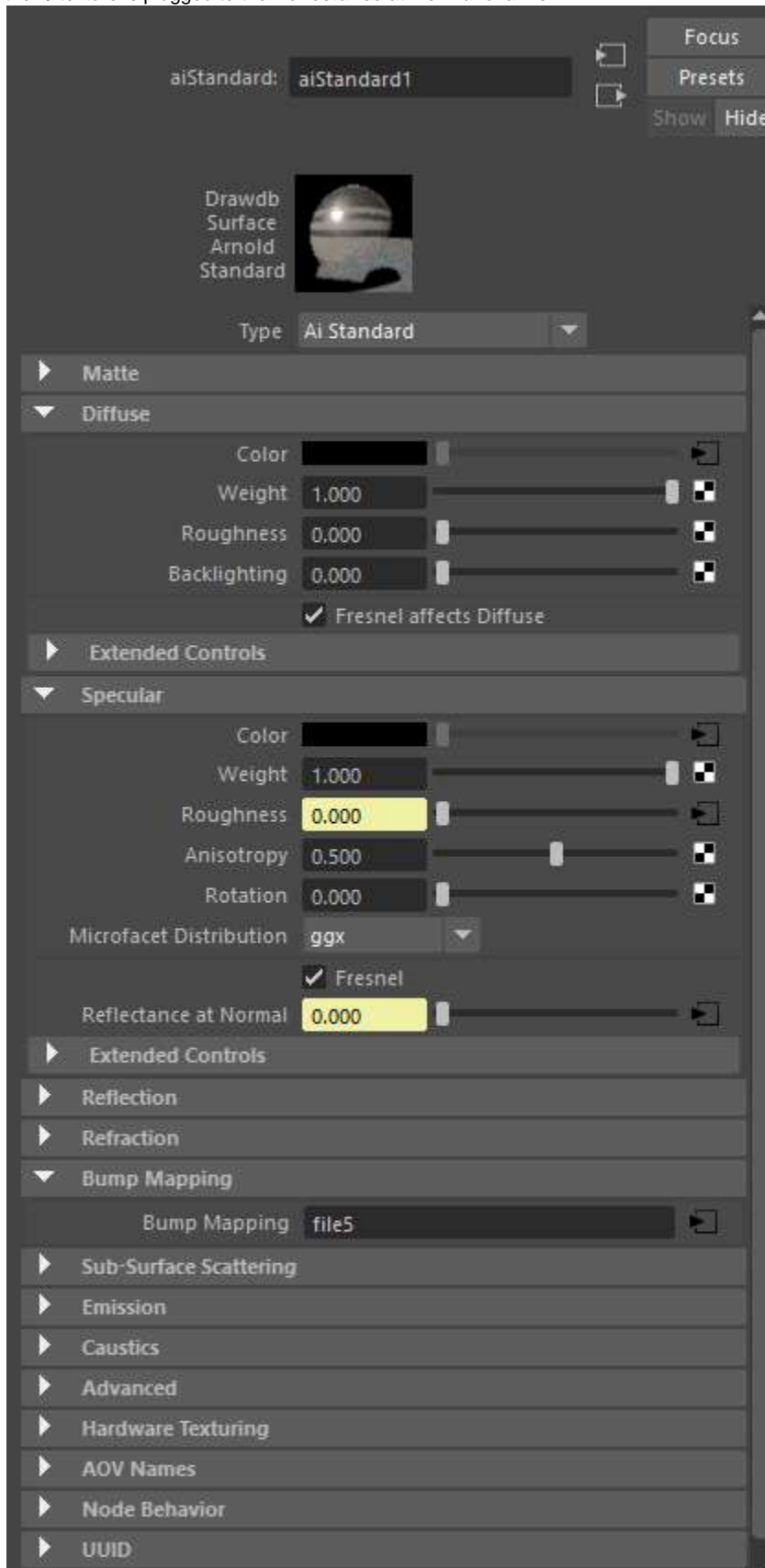
In Arnold you have the choice between two gamma workflows:

Arnold does not make use of the "Color Space" parameter on texture nodes, that's why we have to rely on gammaCorrect nodes.

- You assume all textures should be interpreted as sRGB and you add a gamma correction node for specific textures that should be interpreted as linear. In this case you will set the Gamma Correction for Textures to 2.2.
  - Render Settings:

- Gamma Corrections on textures: 2.2
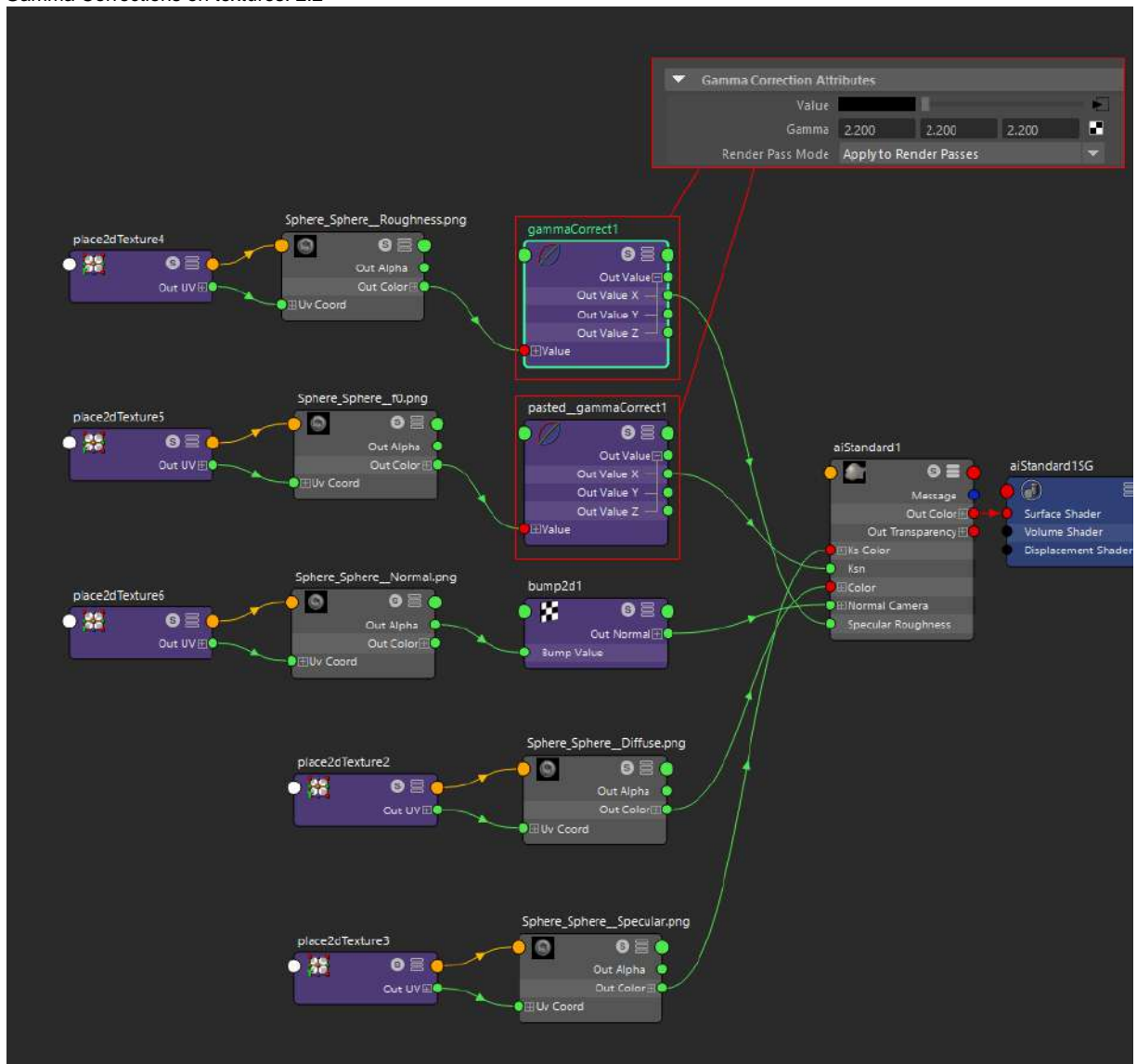
> Note that only the Out Value X from the gammaCorrect node is plugged to the Specular Roughness and Ksn (Reflection at Normal) inputs.

- You assume all textures should be interpreted as Linear and you add a gamma correction node for specific textures that should be interpreted as sRGB. In this case you will set the gamma Correction for Textures to 1.0

- Render Settings:

- Gamma Corrections on textures: 0.454
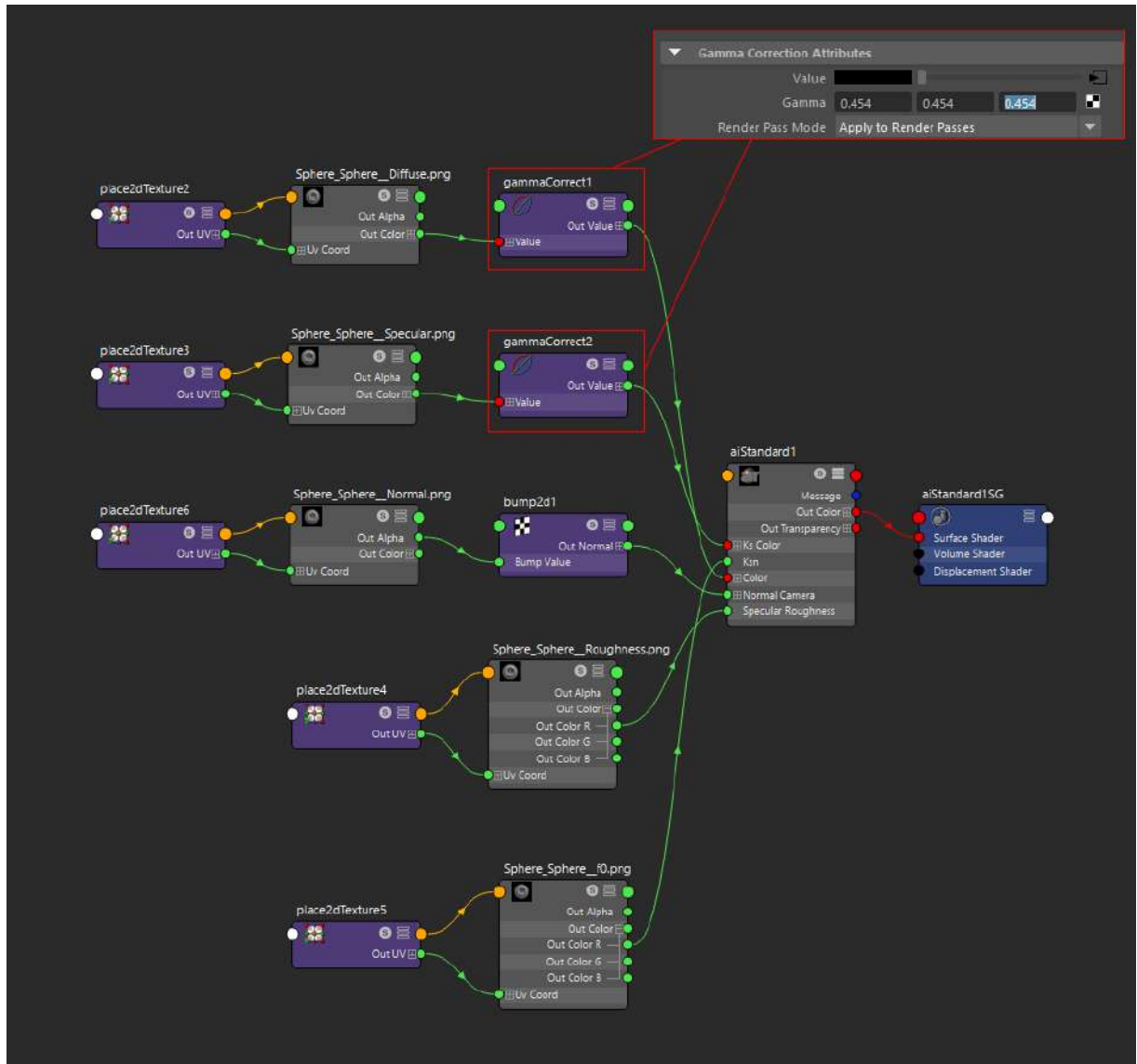
Note that only the Out Color R from the Roughness and f0 textures are plugged to the Specular Roughness and Ksn (Reflection at Normal) inputs.

Using UDIMs

- In Substance Painter select the Arnold UDIM export preset
- Until Substance Painter can directly export .tx files, it is advised to convert your texture to .tx using the TX Manager
- use the same shader setup as above
- On the file Texture nodes, simply change the UV Tiling Mode to "UDIM (Mari)"

- That's all!

Vela_UDIM_f0_1   place2dTexture8

file: Vela_UDIM_f0_1

Focus
Presets
Show   Hide

Sample

▼   File Attributes

Filter Type   Off   ▼

☐ Pre Filter

Pre Filter Radius   2.000   ▪

Image Name   t\udim_textures\Vela_UDIM_f0.<UDIM>.tx   📁

Reload   Edit   View

UV Tiling Mode   UDIM (Mari)   10 tiles found

Preview Quality   High Quality   ▼   **Generate Preview***

☐ Use Image Sequence

Image Number   1   ▪

Frame Offset   0   ▪

Color Space   Raw   ▼

☐ Ignore Color Space File Rules
☐ Use BOT
☐ Disable File Load

▶   Interactive Sequence Caching Options
▶   Color Balance
▶   Effects
▶   UV Coordinates
▶   Arnold
▶   Node Behavior
▶   UUID
▶   Ptex Controls
▶   Extra Attributes

Keyshot

Keyshot 6.1.72

Download Example Scene

Substance Painter Export

1. For Keyshot, you will need to configure an export preset using Diffuse, Reflection, Metallic, Roughness and Normal (direct X).
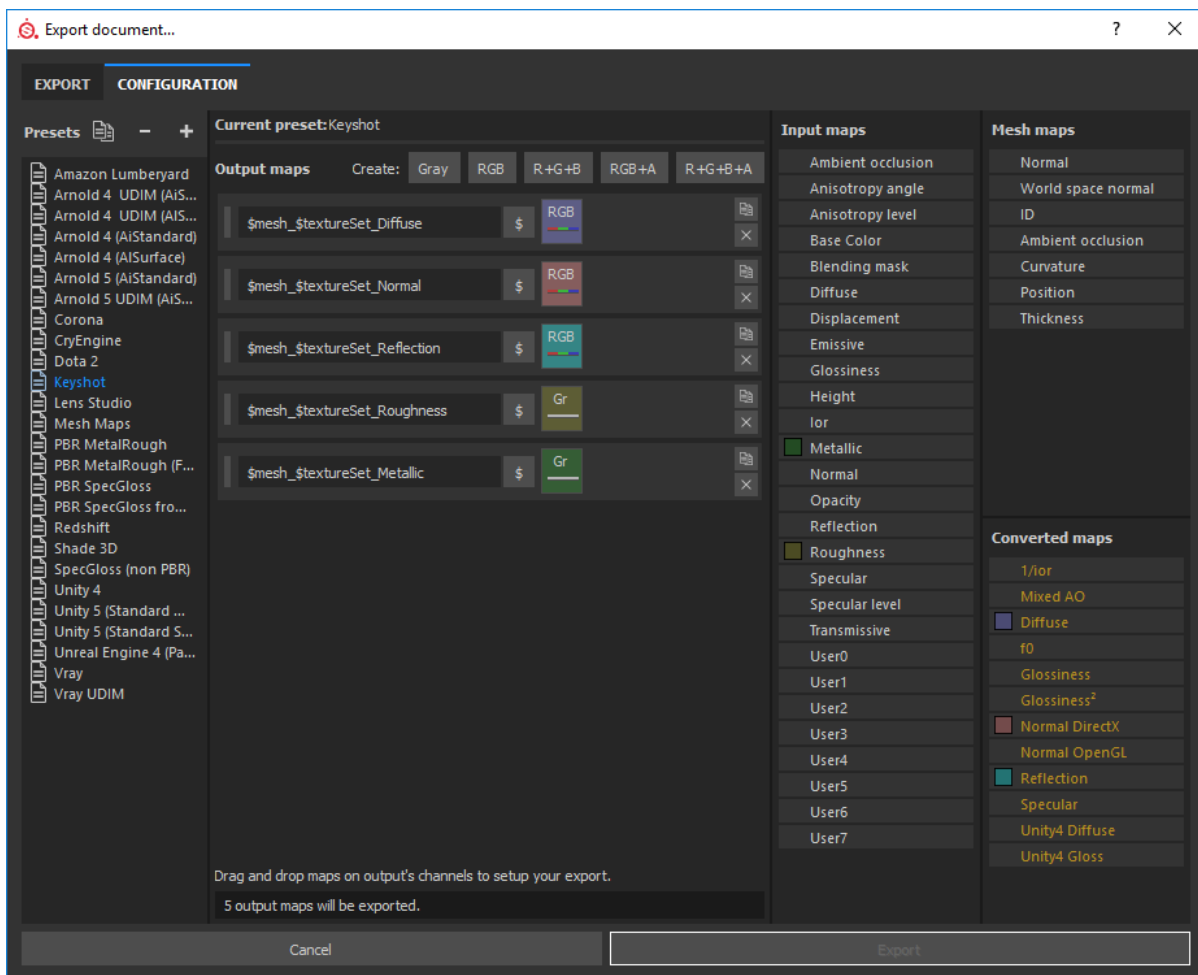
Advanced Material Setup

You will use 2 advanced materials. The first one will be for metallic and the second one will be for dielectric.

1. Set your material to Advanced and graph the material.

   Metallic:
   a. Set the Refraction Index to 10
   b. Set the maps as indicated in the table below:

Substance Painter texture	Advanced Material Channel
Diffuse	Diffuse
Metallic	Opacity
Normal	Bump *Normal Enabled
Roughness	Roughness
Reflection	Specular

2. Create a new Advanced Material

Dielectric:
a. Set the Refraction Index to 1.5
b. Set the maps as indicated in the table below

Substance Painter texture	Advanced Material Channel
Diffuse	Diffuse
Normal	Bump *Normal Enabled
Roughness	Roughness
Reflection	Specular

3. Take the output of the Metallic Advanced Material and add it to the + of the Dielectric Advanced Material. This will create a Label field on the material.
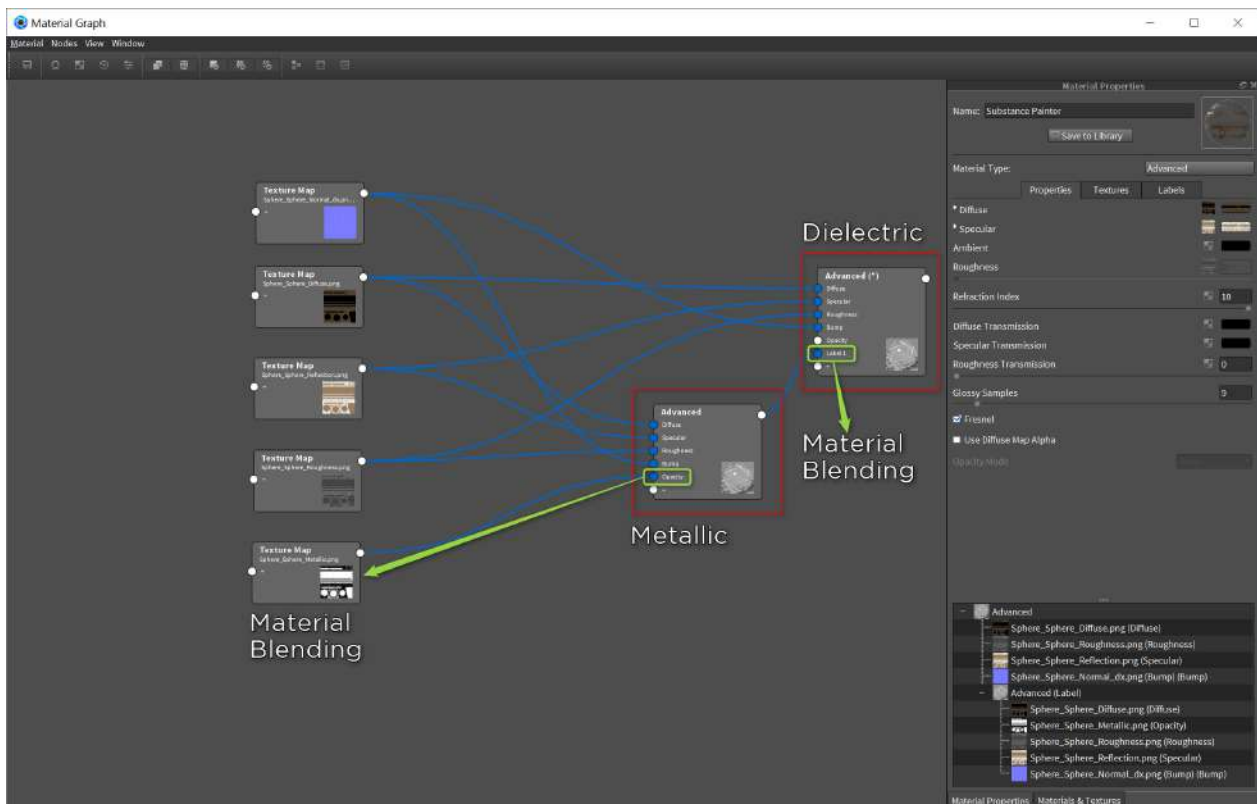
Marmoset Toolbag 2

Toolbag 2.08

Substance Painter uses the metallic PBR shader as default, however, you can also use with specular/glossiness shader. This workflow will show how to use the metallic outputs for Toolbag 2. Toolbag supports the metallic workflow.

Download Example Scene

Substance Painter Export

1. When using the default metallic PBR shader, we can export using the default Document channels + Normal + AO export preset. ***Document channels exports Normal Map based on Project Configuration. Toolbag requires OGL Normal map. You can switch the Normal Format in the Project Configuration.***
2. Alternatively, you can create a custom export config that uses glossiness
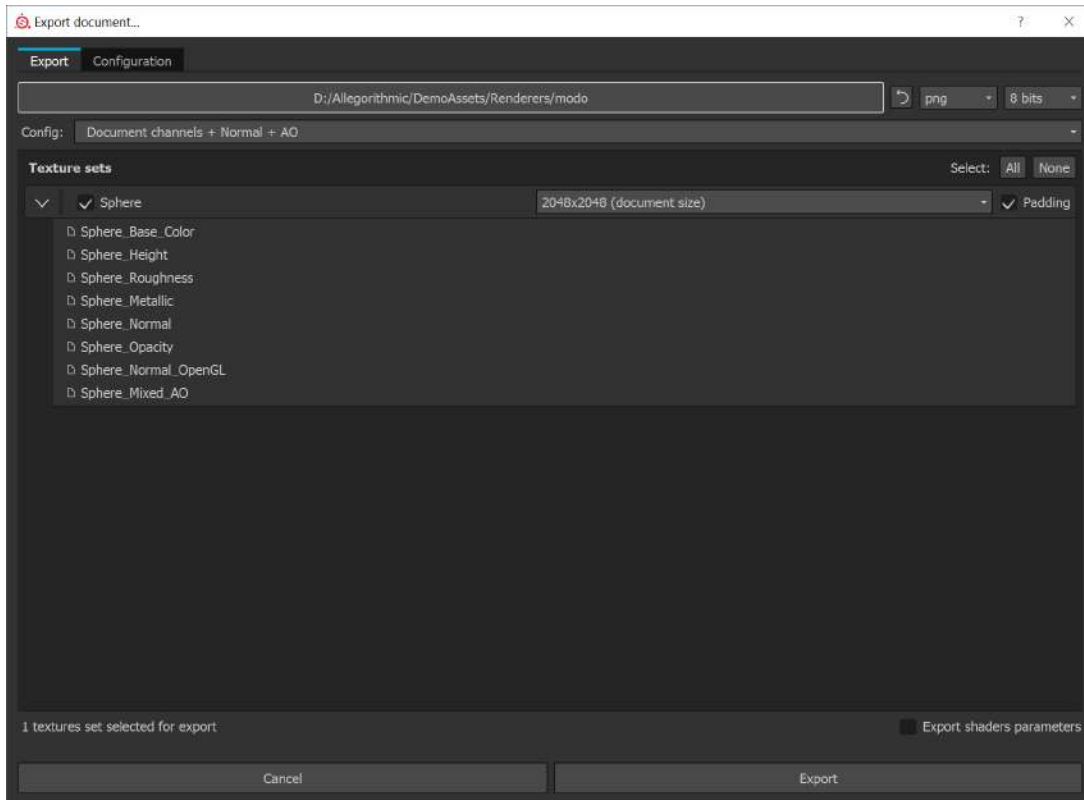
3. You can change the Normal Format to OpenGL before exporting. **Edit>Project Configuration**
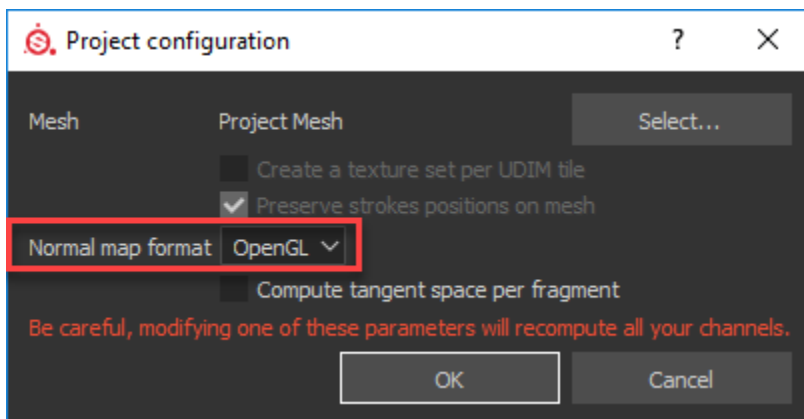
Material Setup

1. Set Reflectivity to Metalness
2. Set Reflection to GGX

3. Add the textures to the appropriate channels as shown in the following chart:

Substance Painter Texture	Colorspace	Toolbag Material
Base Color	sRGB	Albedo
Roughness	sRGB Off	Microsurface - Gloss - Click Invert
Metallic	sRGB Off	Reflectivity - Metalness Map
Normal	sRGB Off	Normal
Ambient Occlusion	sRGB Off	Occlusion
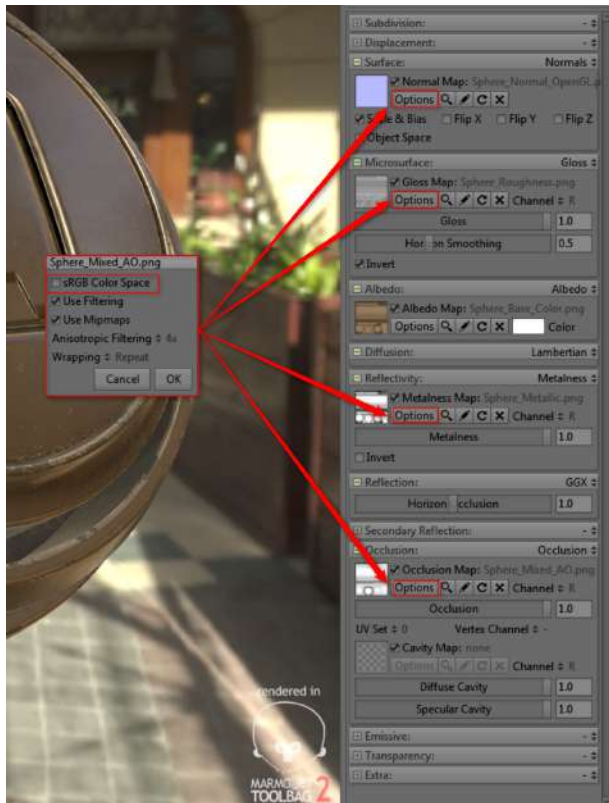
Mental Ray for Maya

Maya 2016 Extension 2 - Mental Ray for Maya 2016R2.0 - 3.13.1.11

In this workflow it is recommended to use the MILA material. In Substance Painter, you have the ability to work with metallic/Roughness or Specular/Glossiness workflows and these shaders are geared towards real-time usage. However, Substance Painter can export textures for use with Mental Ray. By configuring an export preset, you can export the converted maps needed to work the MILA material Mental Ray doesn't currently support GGX BRDF, so it's not possible to get an exact match to Substance Painter's viewport.

Download Example Scene

Substance Painter Export

1. In your Project go to File / Export Textures...
2. In the configuration tab, create a preset as shown in the image. Alternatively, you can download the Mental Ray MILA Preset and copy it to "C:\Users\xxx\Documents\Substance Painter 2\shelf\export-presets
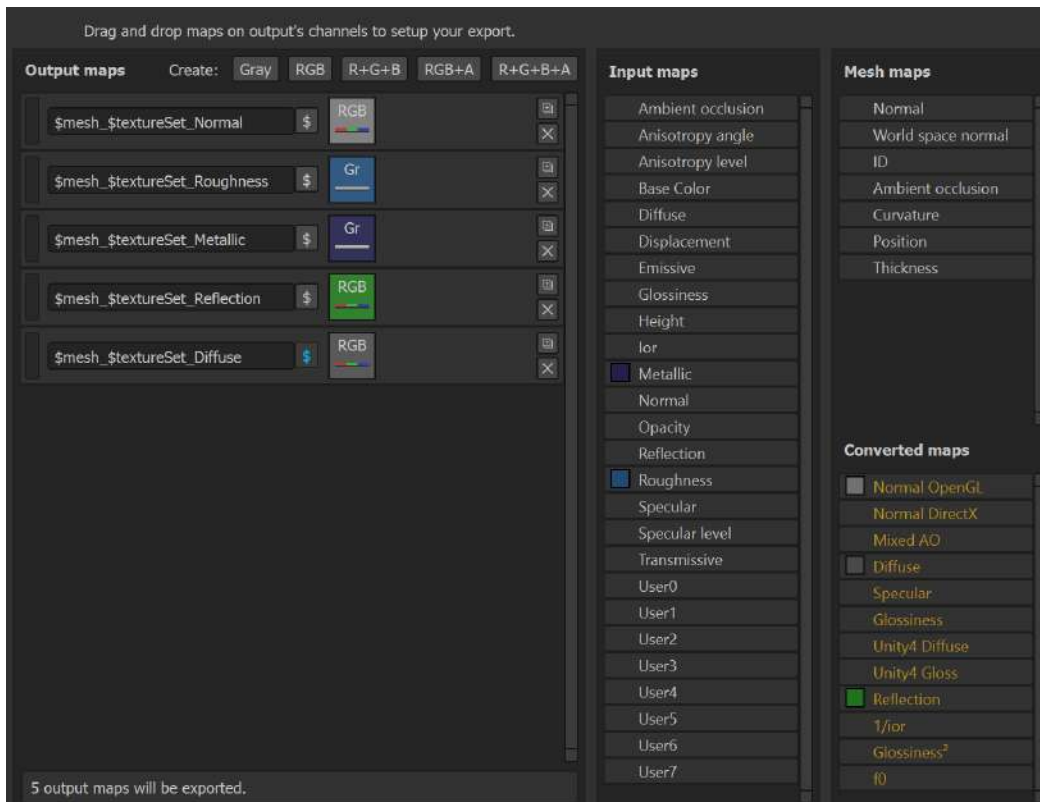
MILA Material Setup

1. Create a MILA material
2. Import the textures exported from Substance Painter into Maya
3. You will need to create 3 layers for the MILA shader. 1 for Diffuse, 1 for Metals (Fresnel Layer - Glossy Reflection), 1 for Dielectrics (Fresnel Layer - Glossy Reflection)
   If you are only using a dielectric material or only a metallic material, then you do not need 2 Glossy Reflection layers. The 2 layers are needed for materials that have both dielectric and metallic. The metallic map is used as a mask for the layers.
4. Layer[1] Metal. This layer is needed if your material has raw metal.
   Set the Fresnel IOR to 50
   Add the metallic map to the Weight input
   Add the reflection map to the Color
   Add the roughness map to the Roughness *Roughness needs to be remapped. See the Roughness section for details.*
5. Layer[0] Dielectric. This layer is for non-metals
   Set the Fresnel IOR to 1.5
   Add the metallic map to the Weight input. Metallic map needs to be inverted. Create a Reverse node. Take the Out Color of the metal map and add it to Input 1 of Reverse Node. Plug Output X of the Reverse node to the Weight.
   Add the reflection map to the Color
   Add the roughness map to the Roughness *Roughness needs to be remapped. See the Roughness section for details.*

Substance Painter Texture	Colorspace	MILA Material Channel
Diffuse	sRGB	Base Component - Diffuse - Color
Layer[1] Metallic **Fresnel Glossy Reflection**		**Layer for raw metal**
Metallic	RAW	Weight
Roughness² (alpha gain 2.0)	RAW	Roughness
Reflection	sRGB	Color
Fresnel IOR	-	Set value to 50.00
Layer[0] Dielectric **Fresnel Glossy Reflection**		**Layer for non-metal**
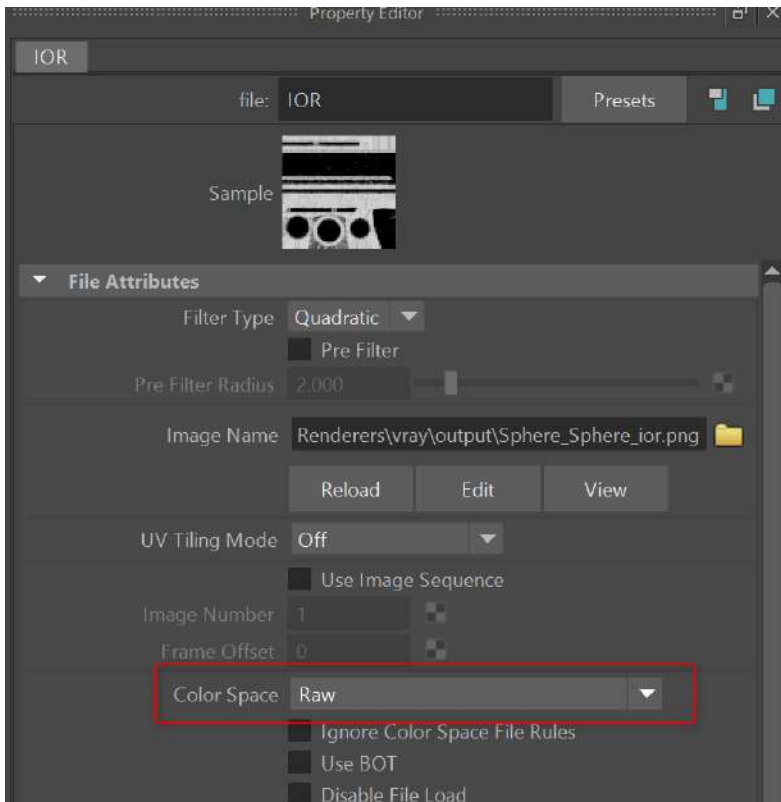
Metallic (Reversed)	RAW	Weight
Roughness² (alpha gain 2.0)	RAW	Reflection Glossiness
Reflection	sRGB	Color
Fresnel IOR	-	Set value to 1.5
Normal Mapping		
Normal (Open GL) bump2D node - tangent space normal	RAW	Material Properties - Overall Bump

*For Roughness and Metallic, you need to make sure Alpha is Luminance is enabled on the Texture2DNode under Color Balance.
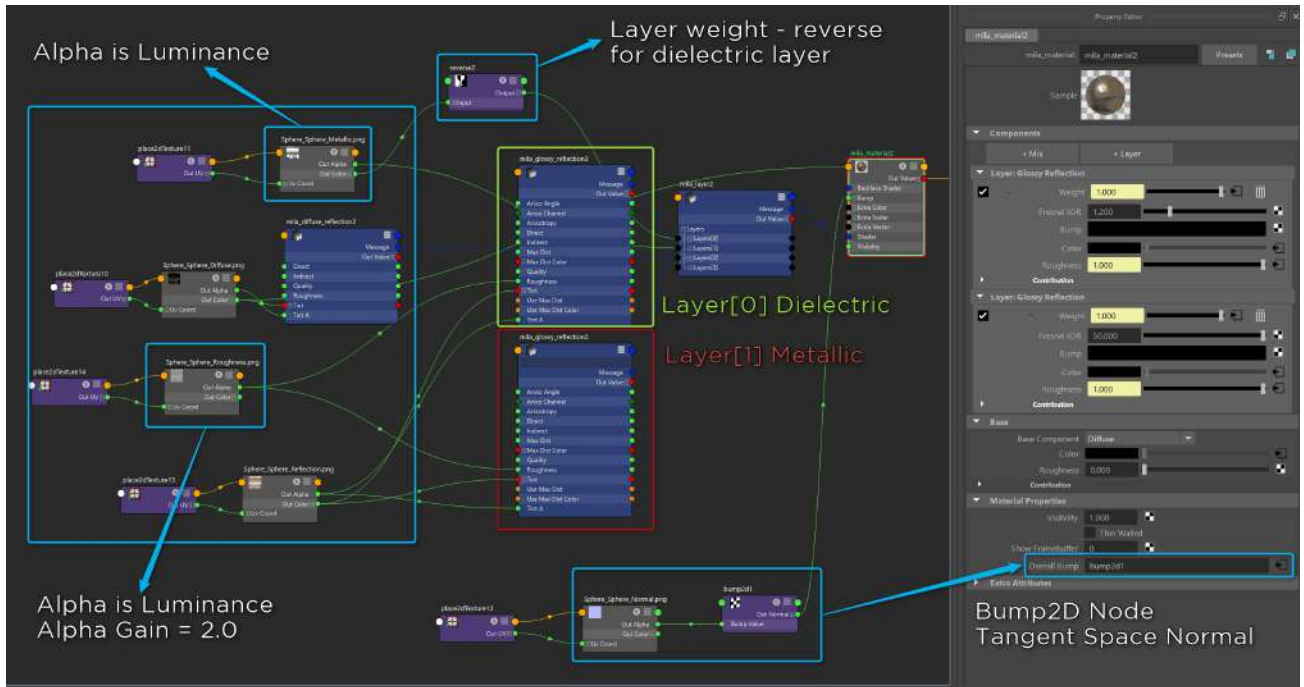
Colorspace

It's important to make sure that textures are interpreted properly for a linear workflow. You can change the colorspace for textures on the Texture2D node. Be sure to set the Colorspace for each map as listed in the above table.

Roughness

Mental Ray doesn't support GGX gloss curve. In order to better approximate the roughness, you need to square the result. This can be done using the Alpha Gain on the texture.

1. Under Color Balance, make sure that Alpha is Luminance is checked.
2. Set the Alpha Gain to a value of 2.0.
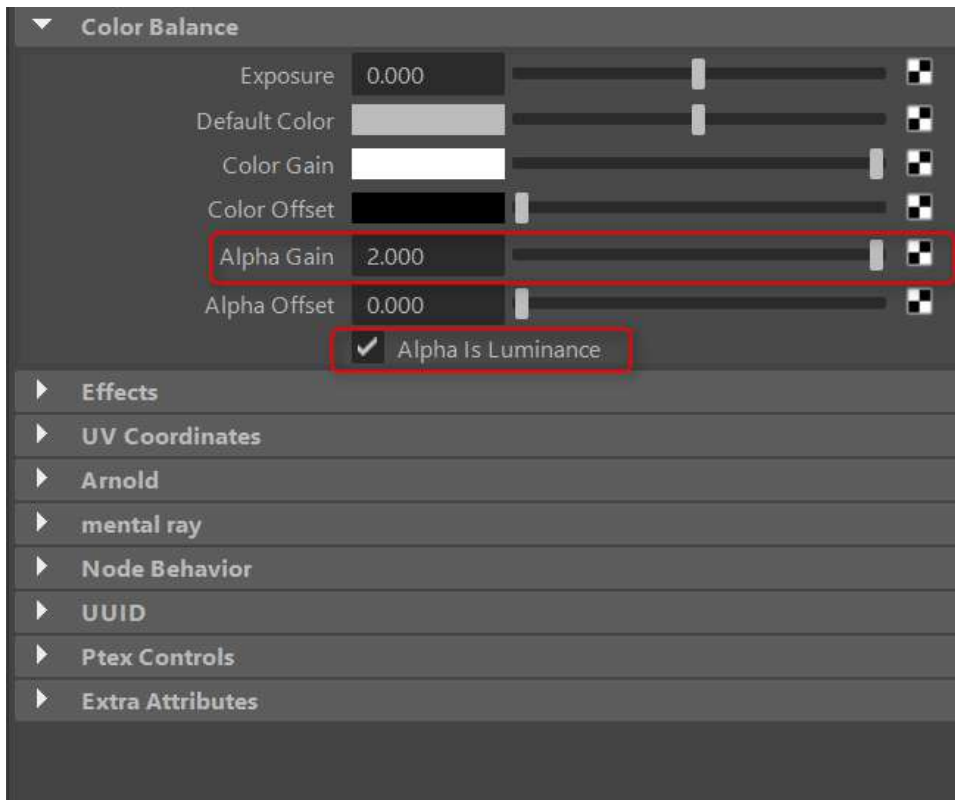
MODO

MODO 10.1 - Unreal Material

Modo 10 series has several options for rendering physically based materials. The MODO material defaults to a physically-based shading model that works well with Substance Painter maps. MODO 10 also provides an Unreal material that allows you to work directly with the default metallic/roughness shader from Substance Painter.

Example Demo Scene

Substance Painter Export

1. When using the default metallic PBR shader, we can export using the default Document channels + Normal + AO export preset. ***Docum ent channels exports Normal Map based on Project Configuration. MODO requires OGL Normal map. You can switch the Normal Format in the Project Configuration.***
2. Alternatively, you can export using either the Unreal or Unity preset for the MODO. These export presets have outputs where the channels are packed for optimization. If you would like to use these packed maps in MODO, you will need to use the Swizzle option on the texture to target the correct channel. ***Please refer to the MODO Swizzle Channel section.***
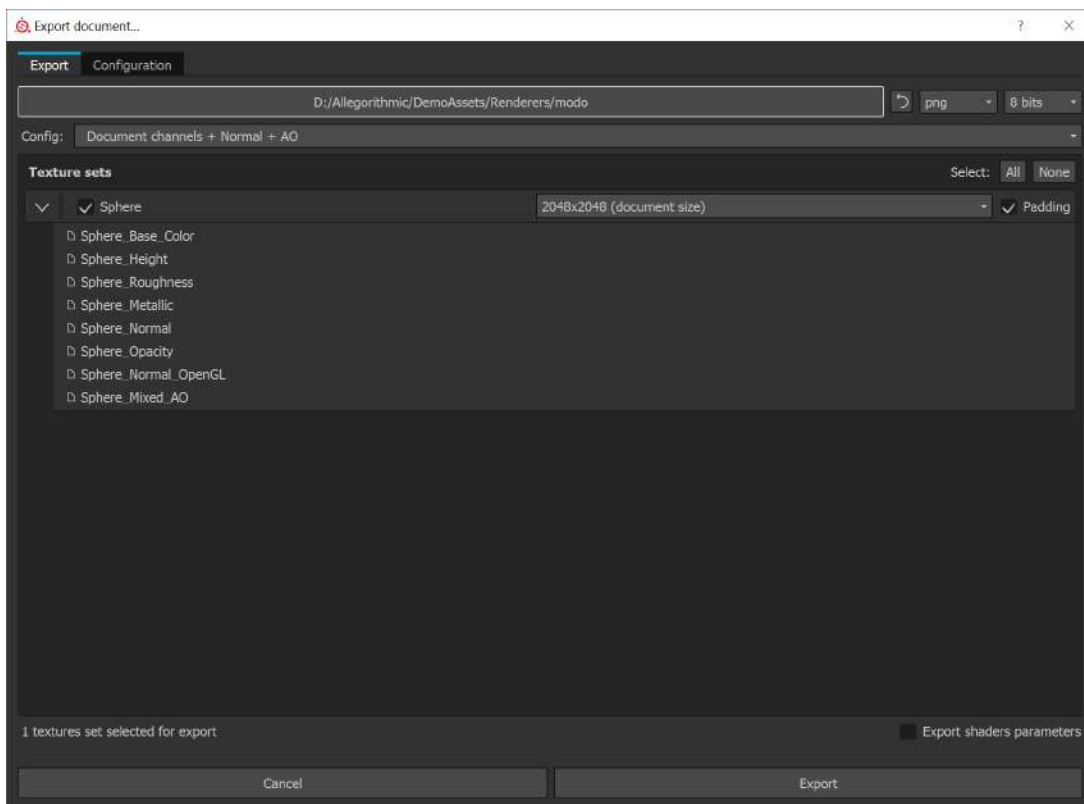
3. You can change the Normal Format to OpenGL before exporting. **Edit>Project Configuration.** This is needed when exporting using the Document channels + Normal + AO export preset.
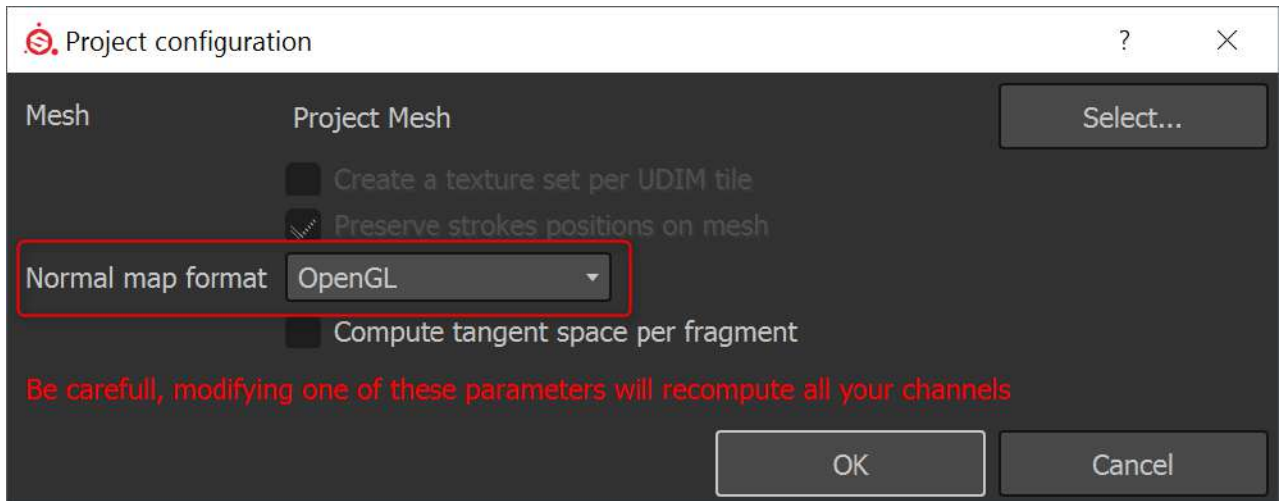
Unreal Material Setup

1. Import the textures exported from Substance Painter into MODO's clip browser.
2. Create a Unreal Material.
3. Add the textures from the Clip Browser to the Shader Tree material group and set the layer effect for each texture to the Unreal Material Channel.
   Be sure that the colorspace for textures are marked appropriately as shown in the graph below. This can be done on the Properties>Image Still tab.

Substance Painter Texture	Colorspace	Unreal Material Layer Effect
Base Color	sRGB	Unreal Base Color
Roughness	Linear	Unreal Roughess
Metallic	Linear	Unreal Metallic
Normal	Linear	Unreal Normal
Ambient Occlusion	Linear	Unreal Ambient Occlusion
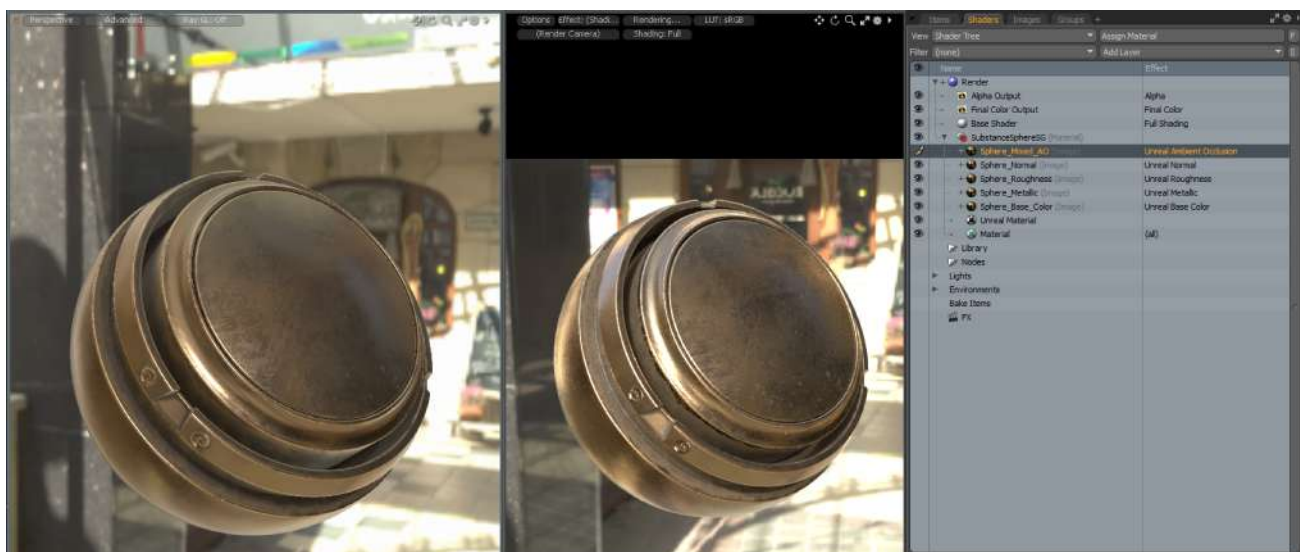
Unity Material Setup

1. Import the textures exported from Substance Painter into MODO's clip browser.
2. Create a Unity Material.
3. Add the textures from the Clip Browser to the Shader Tree material group and set the layer effect for each texture to the Unreal Material Channel.
   Be sure that the colorspace for textures are marked appropriately as shown in the graph below. This can be done on the Properties>Image Still tab.

Substance Painter Texture	Colorspace	Unity Material Layer Effect
AlbedoTransparency	sRGB	Unity
MetallicSmoothness	Linear	Unity Smoothness
MetallicSmoothness	Linear	Unity Metallic
Normal	Linear	Unity Normal
Ambient Occlusion *not included in the export preset*. You will need to add Ambient Occlusion to the export manually	Linear	Unity Ambient Occlusion
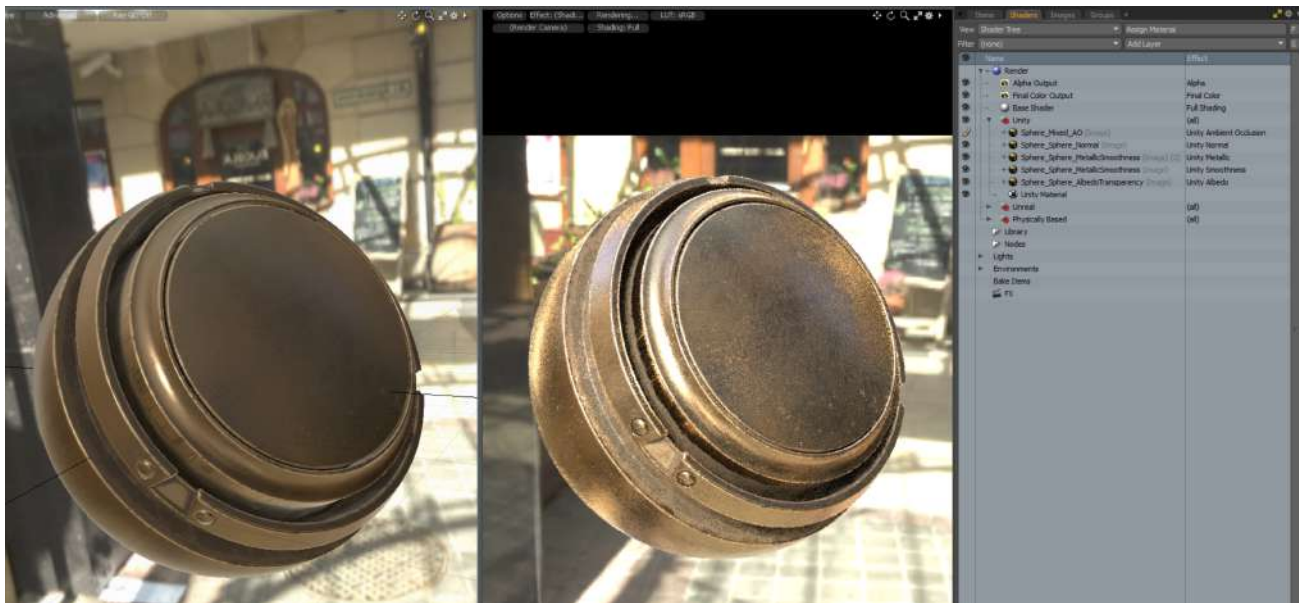
Physically Based Material Setup

You can also use the MODO physically based shading model on materials. You will need to setup an export configuration from Substance Painter as follows:
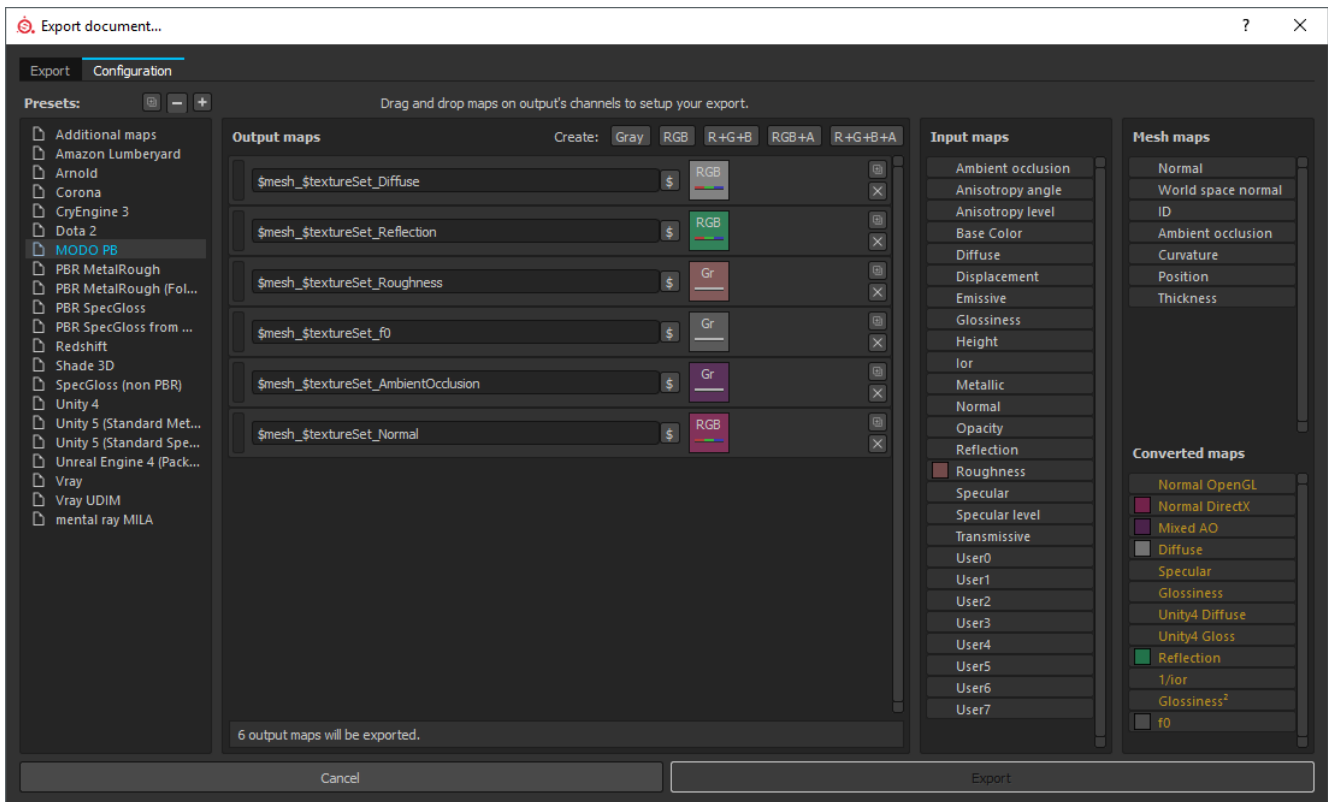
This example show the usage of the converted maps for Diffuse. This assumes you are working in the default metallic/rough shader. If you are using the PBR specular/glossiness shader, then you can use the Diffuse from the Input Map section. In this case, you would export a Glossiness map, but need to invert this in MODO.

1. Import the textures exported from Substance Painter into MODO's clip browser.
2. Make sure you are using a Material with the shading model set to Physically Based
3. Add the textures from the Clip Browser to the Shader Tree material group and set the layer effect for each texture to the Material Channels shown in the table below.
   Be sure that the colorspace for textures are marked appropriately as shown in the graph below. This can be done on the Properties>Image Still tab.

Substance Painter Texture	Colorspace	Material Layer Effect (Physically Based Model)
Diffuse	sRGB	Diffuse
Roughness	Linear	Roughness
Reflection	sRGB	Specular Color
f0	Linear	Specular Amount
Normal	Linear	Normal

MODO Swizzle Channel

You can enable Swizzling on the Texture Layer properties. This allows you to use packed channel data in the image as a specific Layer Effect in the Shader Tree.

Substance Painter Texture	Colorspace	Swizzle Channel	Material Layer Effect (Unreal Engine)
OcclusionRoughnessMetallic	Linear	Red	Unreal Ambient Occlusion
OcclusionRoughnessMetallic	Linear	Green	Unreal Roughness
OcclusionRoughnessMetallic	Linear	Blue	Unreal Metallic
Substance Painter Texture	**Colorspace**	**Swizzle Channel**	**Material Layer Effect (Unity)**

MetallicSmoothness	Linear	Red	Unity Metallic
MetallicSmoothness	Linear	Alpha	Unity Smoothness
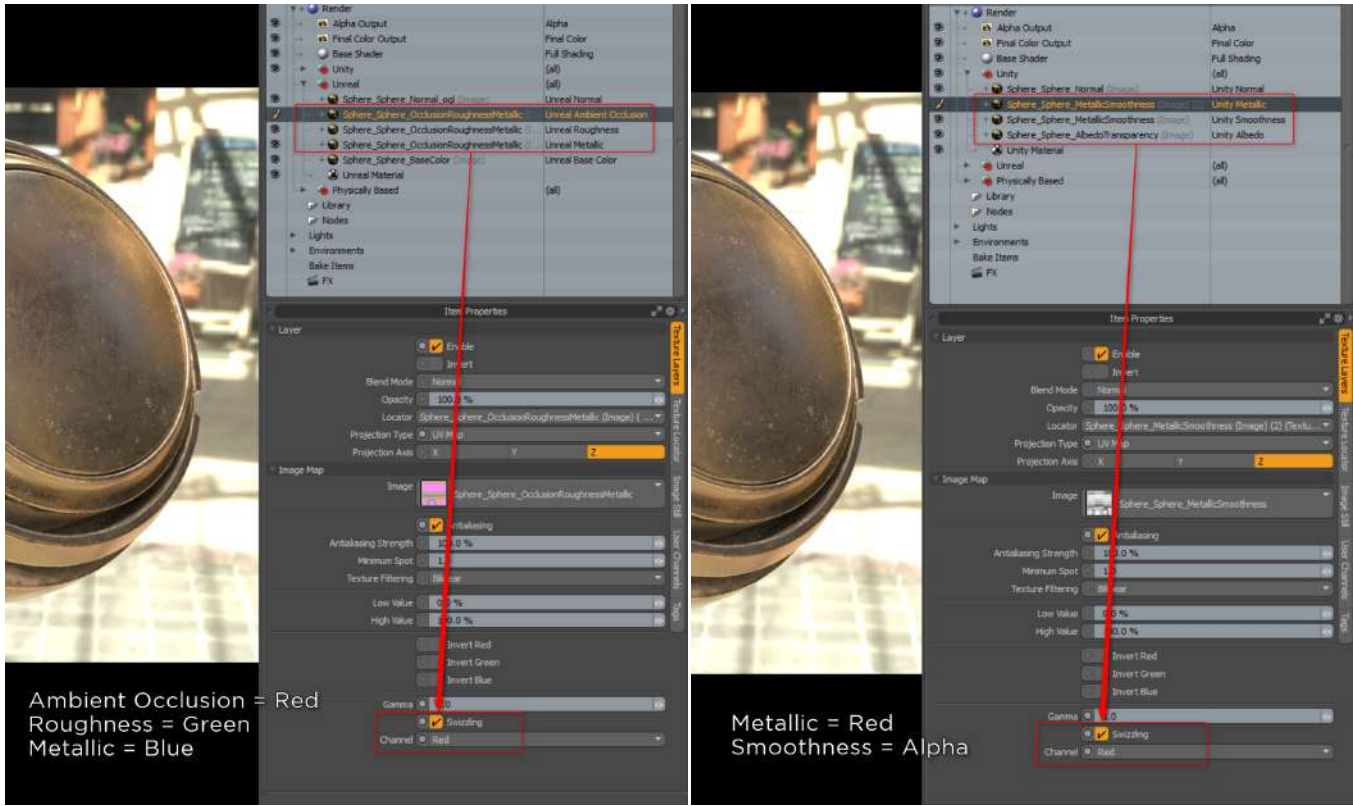
MODO Global Illumination Settings

You need to make sure that you enable Environment Importance Sampling in the Global Illumination Tab.
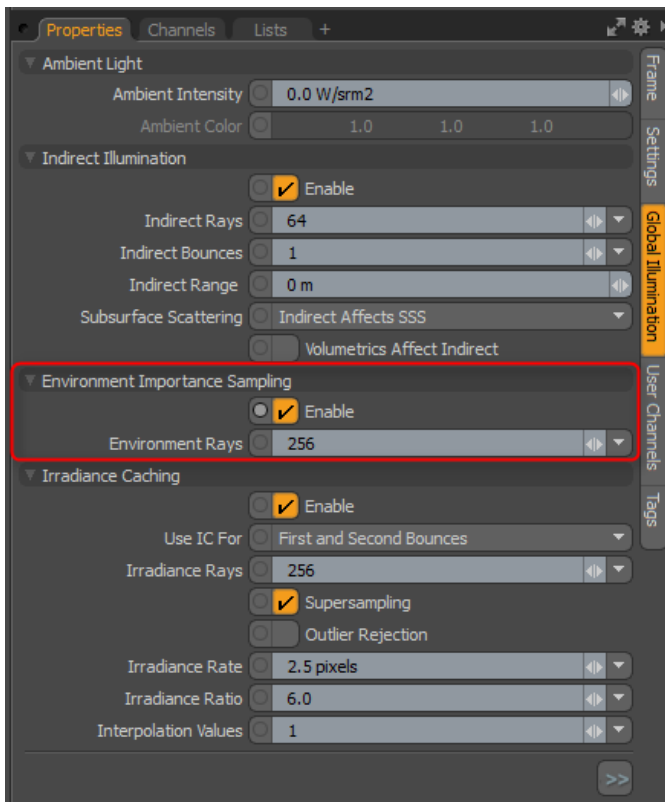
Octane

Substance Painter Export

In the export window of Substance Painter, simply choose the "PBR Metal Rough" preset.

Export document...   ?   ✕

EXPORT   CONFIGURATION

C:/Users/AlexChassany/Documents/Allegorithmic/Substance Painter/export   ↻   png ▾   16 bits ▾

Config   Document channels + Normal + AO (No Alpha)   ▾

Common   Dota 2
          Keyshot
          Lens Studio
Textu   Mesh Maps
          PBR MetalRough
     ›   PBR MetalRough (Folder or PSD Group)
          PBR SpecGloss
     ›   PBR SpecGloss from MetalRough
          Redshift

     ›   ✔ 03_Base   2048x2048 (document size) ▾

3 textures set selected for export   ☐ Export shaders parameters

            Cancel   Export
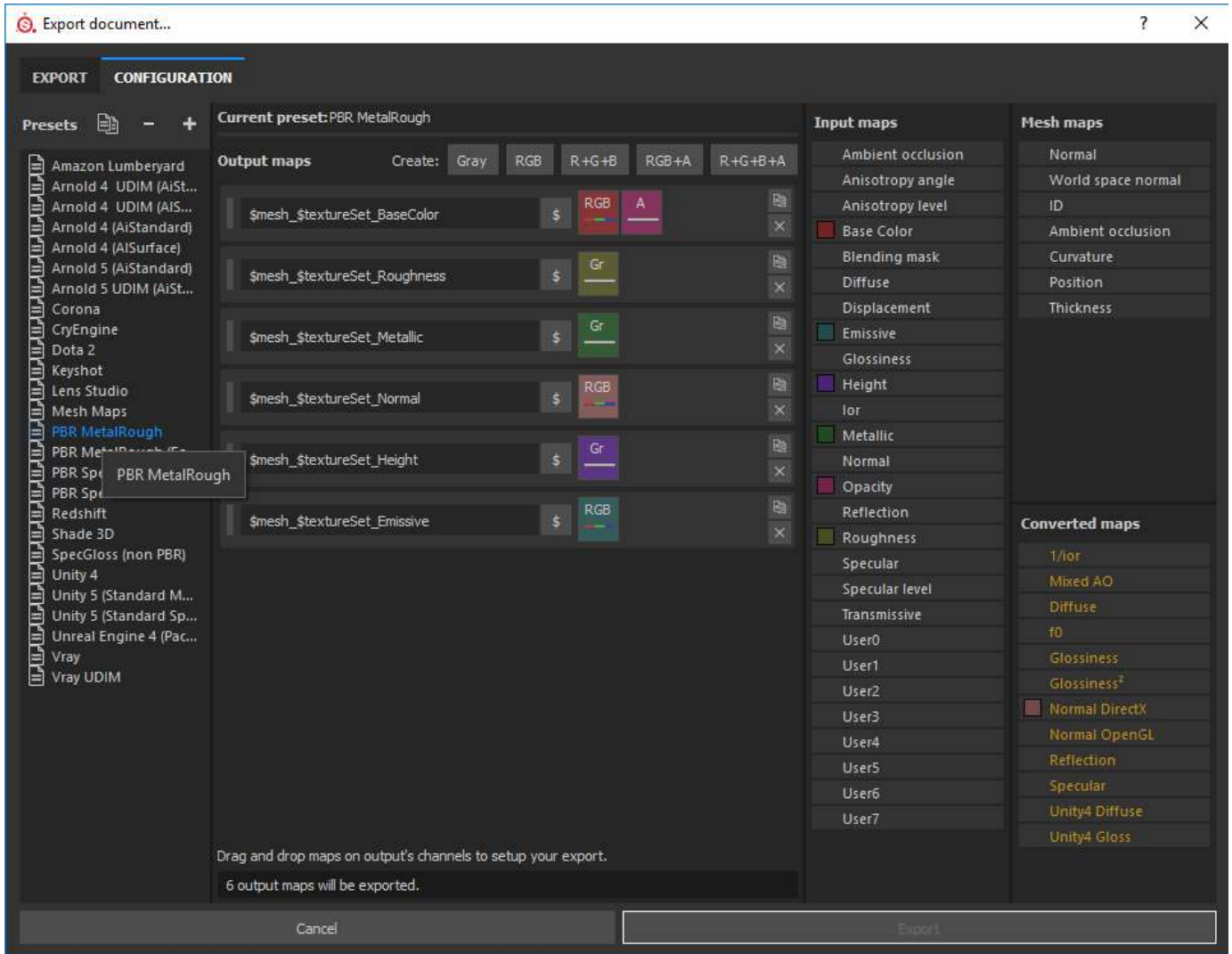
Octane Settings

Under **Live DB > Materials > Misc** find the "**Substance PBR**" material.
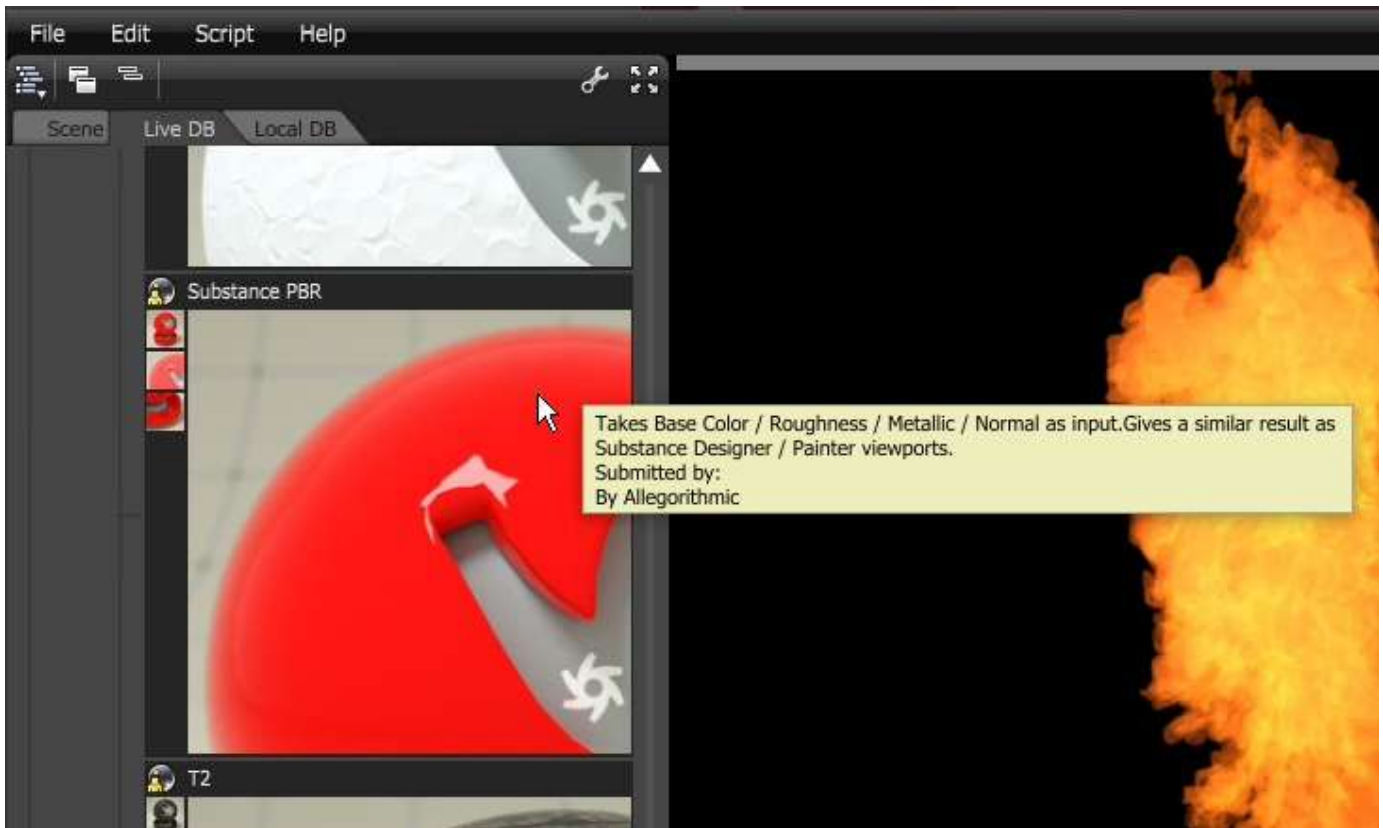
From there simply drag and drop the template into your scene and plug your exported textures :

Redshift for Maya

Maya 2016 Extension 2 - Redshift for Maya 2.0.52

Redshift version 2 supports the metallic/roughness workflow. You can export channels used by the Substance Painter default metallic/roughness PBR Shader. We have supplied a Redshift preset that is designed to be used with Redshift versions prior to the 2.x release. You can download the updated metallic/roughness preset below.

Updated Redshift Export Preset

Substance Painter Export

1. In your Project go to File / Export Textures...
2. In the Export Tab, use the updated Redshift preset or configure a preset as follows:
3. Export the textures.
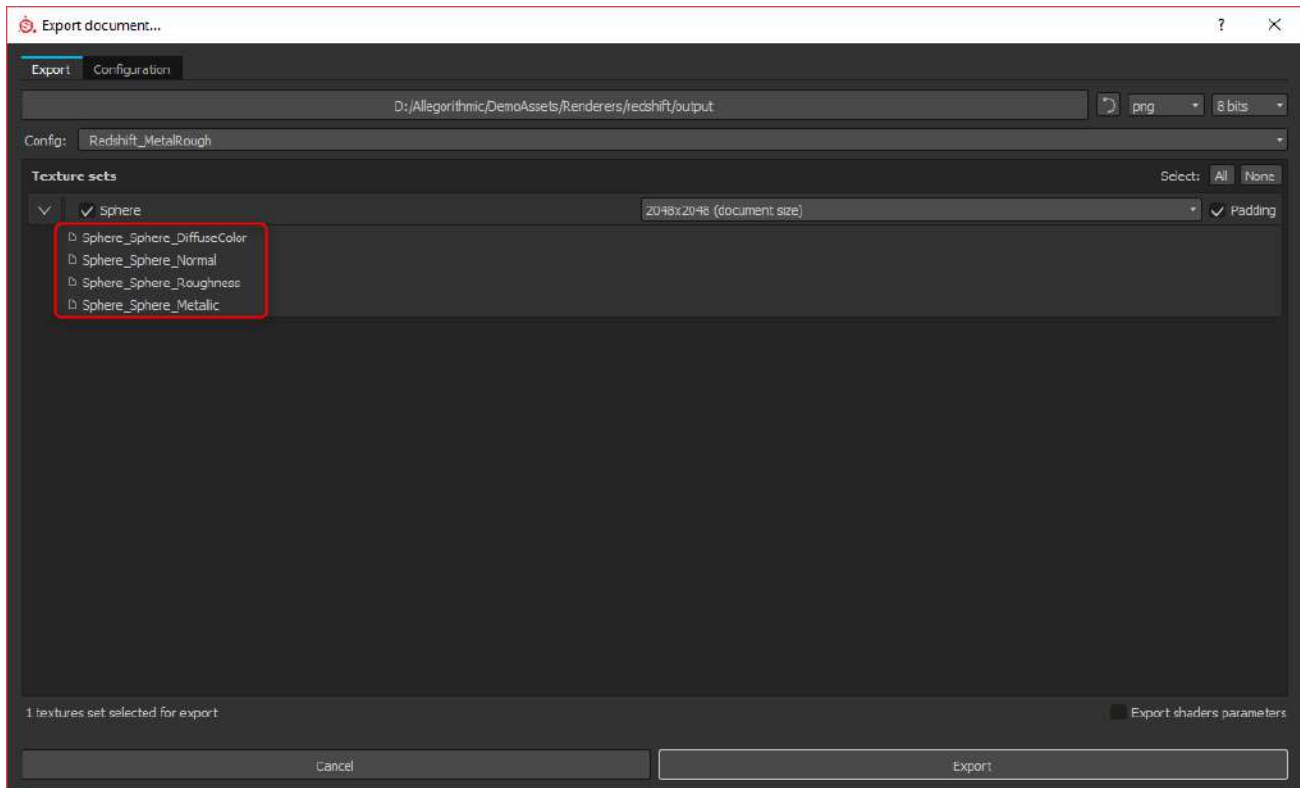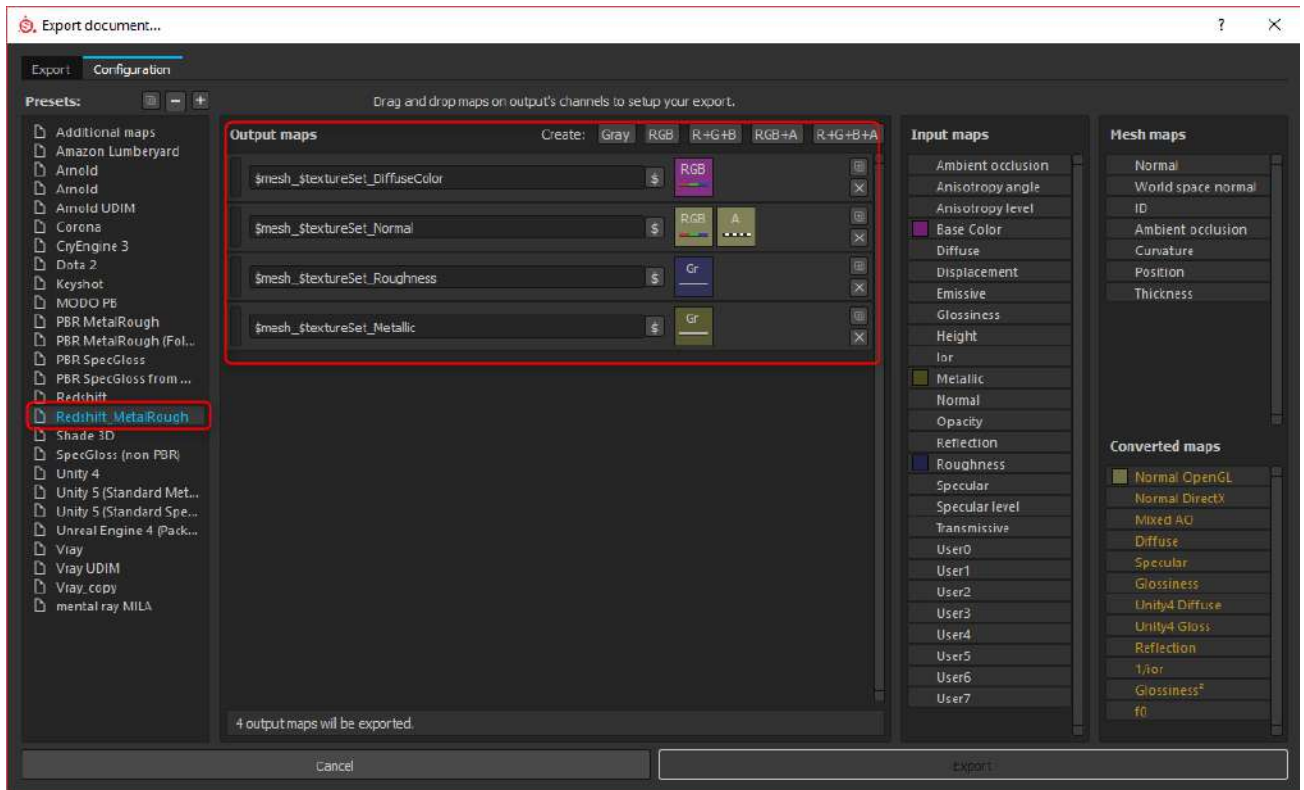
Redshfit Material Setup

1. Create an rsMaterial
2. Import the textures exported from Substance Painter into Maya

Hook up the textures to the input channels as follows...

Substance Painter Texture	Colorspace	Redshift Material Channel
Base Color	sRGB	Diffuse Color
Roughness	RAW	Roughness
Metallic	RAW	Fresnel Type - Metalness
Normal	RAW	Bump and Normal Mapping

* **Set the BRDF Type to GGX in the Reflection parameters**
* **Set the Fresnel Type to Metalness**
* **For best results, use a Redshift Dome Light for the environment**
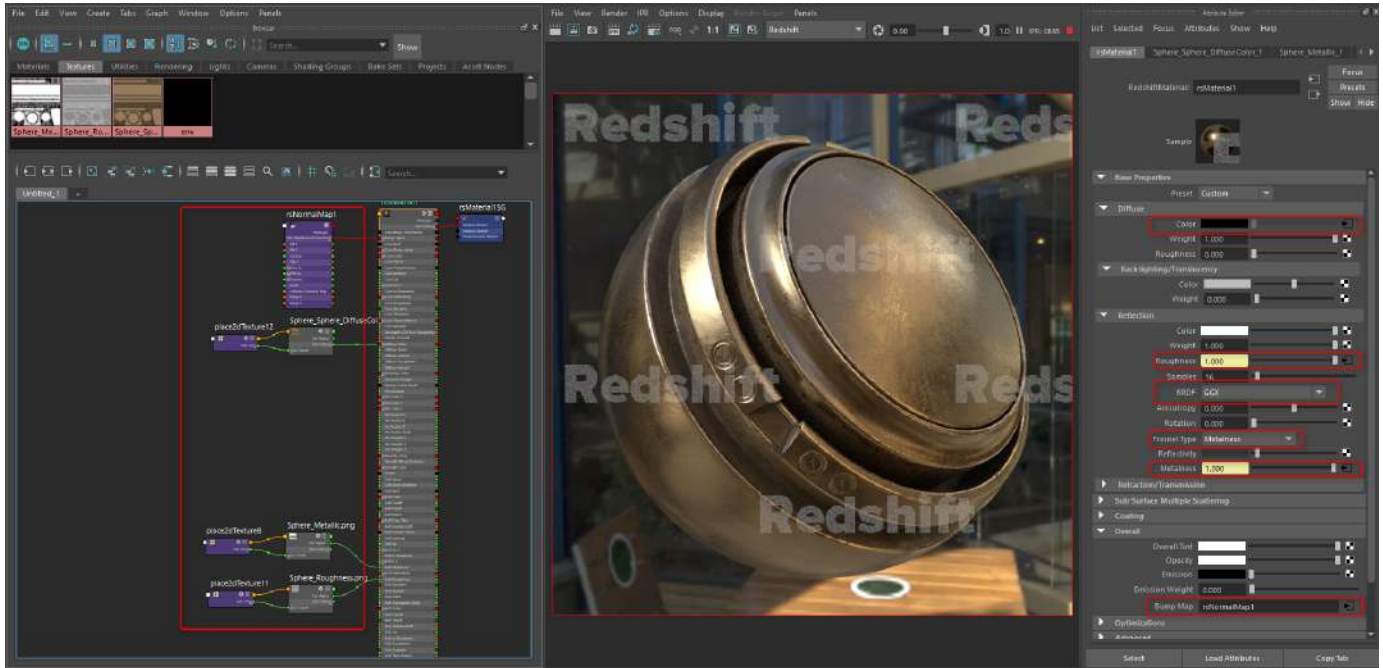
Colorspace

It's important to make sure that textures are interpreted properly for a linear workflow. You can change the colorspace for textures on the Texture2D node. Be sure to set the Colorspace for each map as listed in the above table.
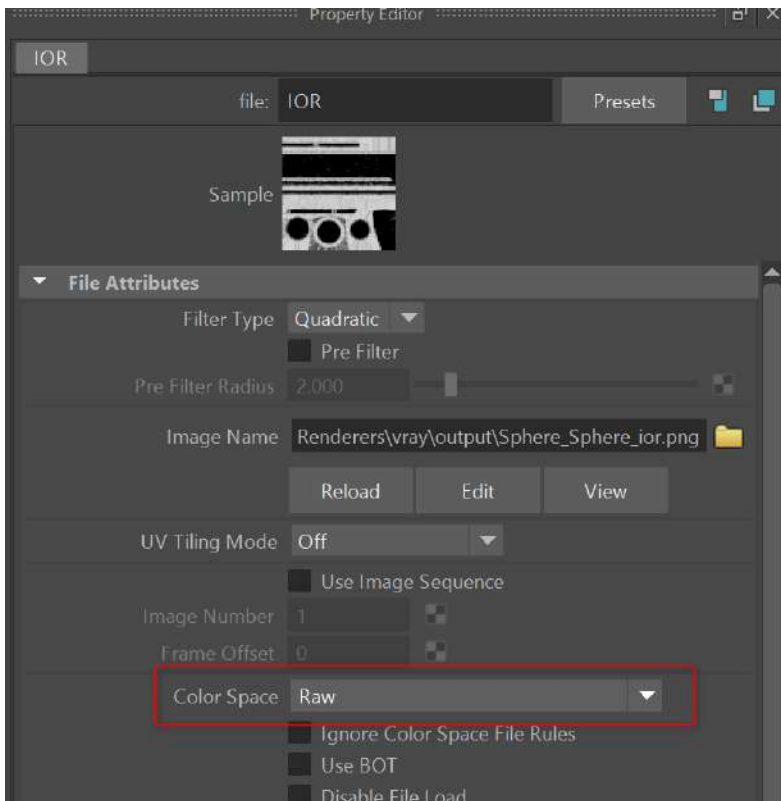
Unity 5

Unity version 5.1.0f3

Unity 5 supports both the metallic and specular PBR workflows. Unity uses a different PBR implementation where glossiness (invert of roughness) is used for both metal and specular shaders. The glossiness map is called "Smoothness" in the Unity shaders.

EXAMPLE UNITY PROJECT

Unity Scene Setup

1. In the Player project settings, set the Color Space to Linear
2. If using HDR on your camera, be sure to disable Anti Aliasing in the Quality settings.
3. An environment is needed for reflections. The HDR maps from Painter can be used and are located in the following directory. (Allegorithmic\Substance Painter\resources\shelf\allegorithmic\environments)
   Import the environment, set it to be a Cube Map, latitude/longitude. Do NOT check the glossiness checkbox on the cube map texture. This will generate pre-convolved mip maps as opposed to traditional mip maps, which is only the right thing to do when using a reflection probe set to custom.
   In all other cases, a pre-convolve step will happen automatically on top which means you'd get pre-convolution on top of an already pre-convolved cube map if glossiness is checked which is incorrect.
4. Create a material using the skybox shader and apply the cube map.
5. In the lighting tab, replace the default material.

   *Substance Painter uses Importance Sampling for the environment and Unity uses mipped-cubemap reflections. Because of this, you will could see some discrepancy in the roughness value range.

Unity Standard Shader (metallic workflow)

1. Export from Substance Painter using the Unity 5 (Standard Metallic) preset.
   *for best results, duplicate this preset and add the ambient occlusion as an additional output.

2. Hook up the textures as shown in the figure below. Be sure to set the color swatch next to Albedo to full white.
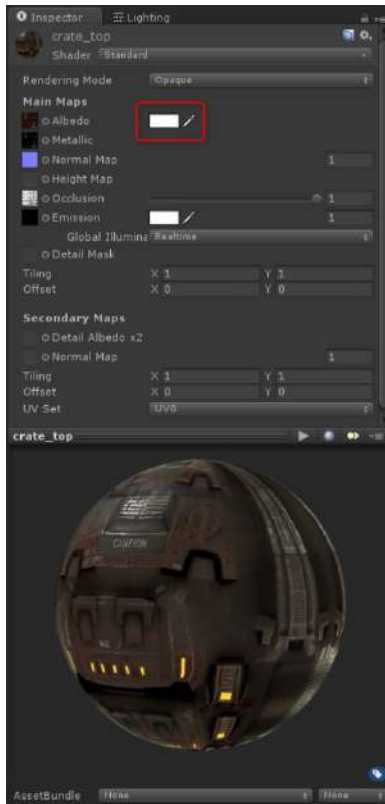
Unity Standard Shader (specular workflow)

1. Export from Substance Painter using the Unity 5 (Standard Specular) preset.
   *for best results, duplicate this preset and add the ambient occlusion as an additional output.

2. Hook up the textures as shown in the figure below. Be sure to set the color swatch next to Albedo to full white.

Reflection Probe Setup

A reflection probe is needed to capture reflections. Currently, the resolution of the reflection probe will change the value of the smoothness map. If the result looks too glossy, lower the reflection probe resolution. A value of 64 - 128 should work.

Unreal Engine 4

(Based on UE4 version 4.11.2)

> UE4 **only** supports the **metallic/roughness PBR workflow**. PBR metallic/roughness is the default shader in Substance Painter. Using the Unreal Engine export preset, you can quickly export maps with packed channels for optimized use in UE4.

> **Triangulate** your mesh before exporting it from your 3D application. The Substance Painter triangulation of polygons **doesn't match** the triangulation made in the Unreal Engine. Therefore it is important to triangulate **before** baking and exporting to keep normal maps synced.

> Make sure the setting "**Compute tangent space per fragment**" is enabled in the project settings. This setting can be activated when creating a New Project, or later when editing its settings via the Project Configuration window.

Download Example Scene

Substance Painter Export

1. Right-Click and choose Export Textures.

2. Choose the Unreal Engine 4 (packed) preset option.
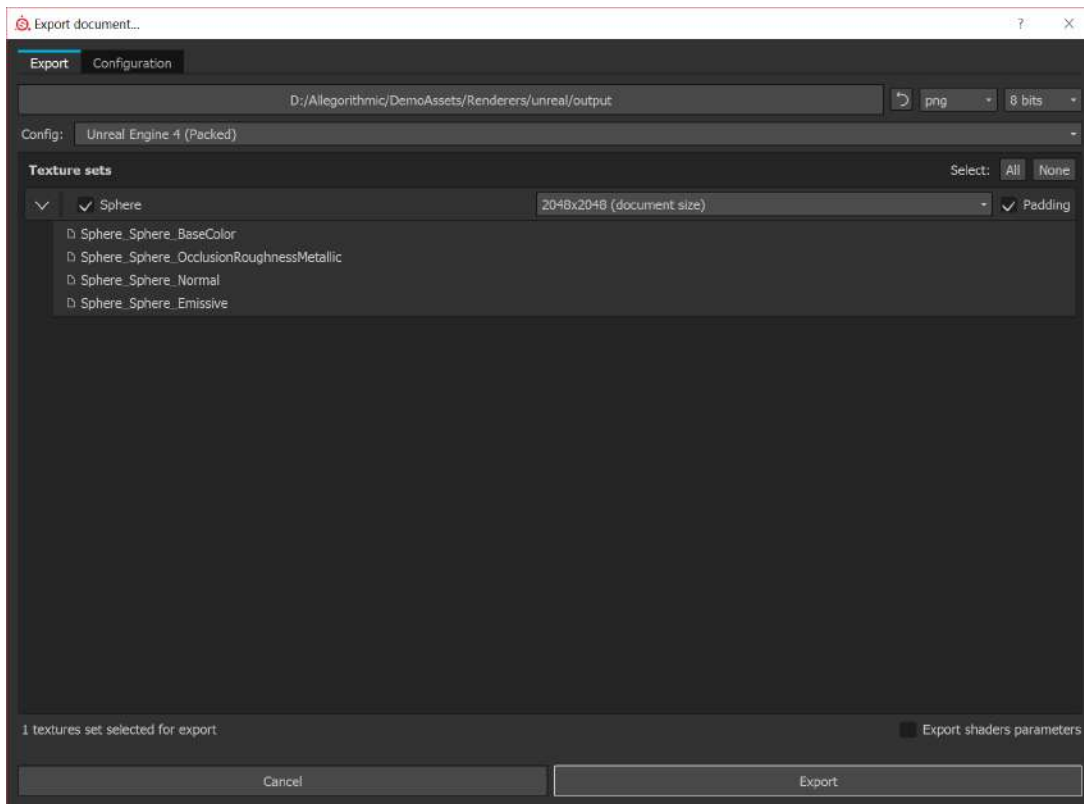
Unreal Material Setup

1. Import the textures into your project.
2. Double-click the OcclusionRoughnessMetallic packed texture and in the Texture Editor, uncheck sRGB.
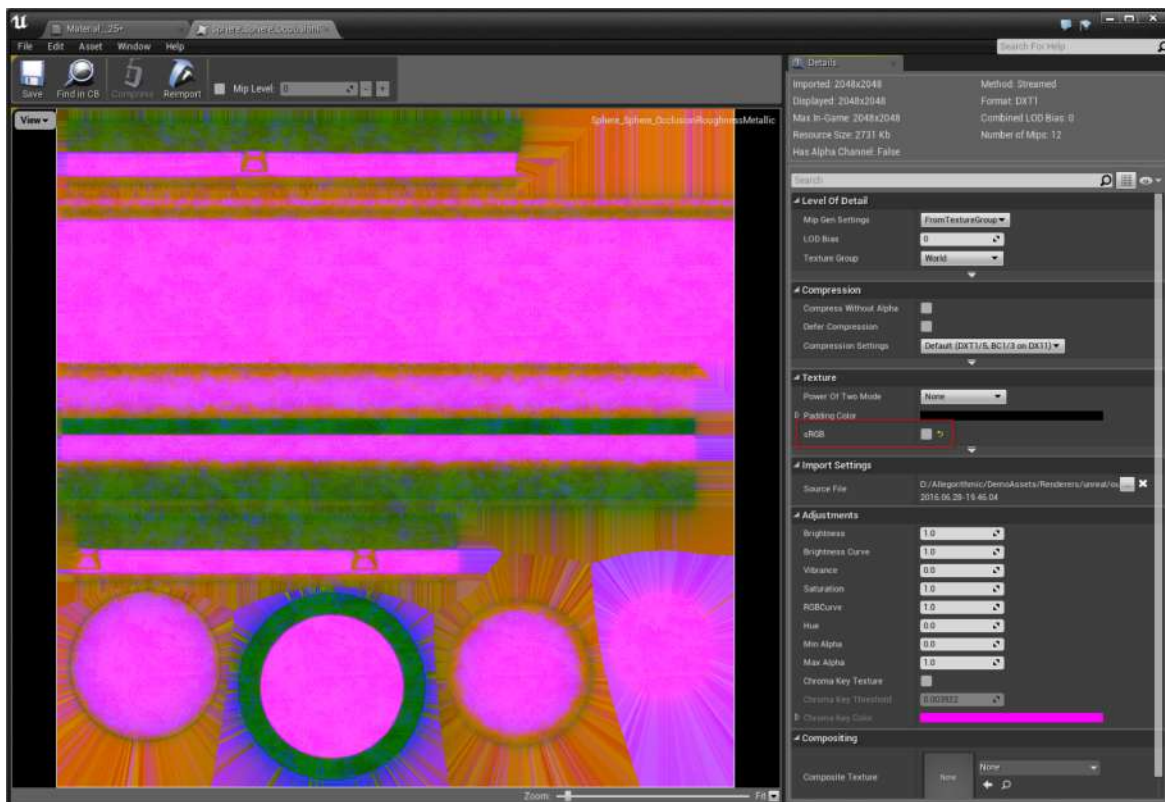
3. Open the material in the Material Editor and assign the maps as follows:

Substance Painter Texture	Colorspace	Unreal Material Channel
Base Color	sRGB	Base Color
OcclusionRoughnessMetallic (Green Channel)	Linear	Roughess
OcclusionRoughnessMetallic (Blue Channel)	Linear	Metallic
OcclusionRoughnessMetallic (Red Channel)	Linear	Ambient Occlusion
Normal	Normal	Normal
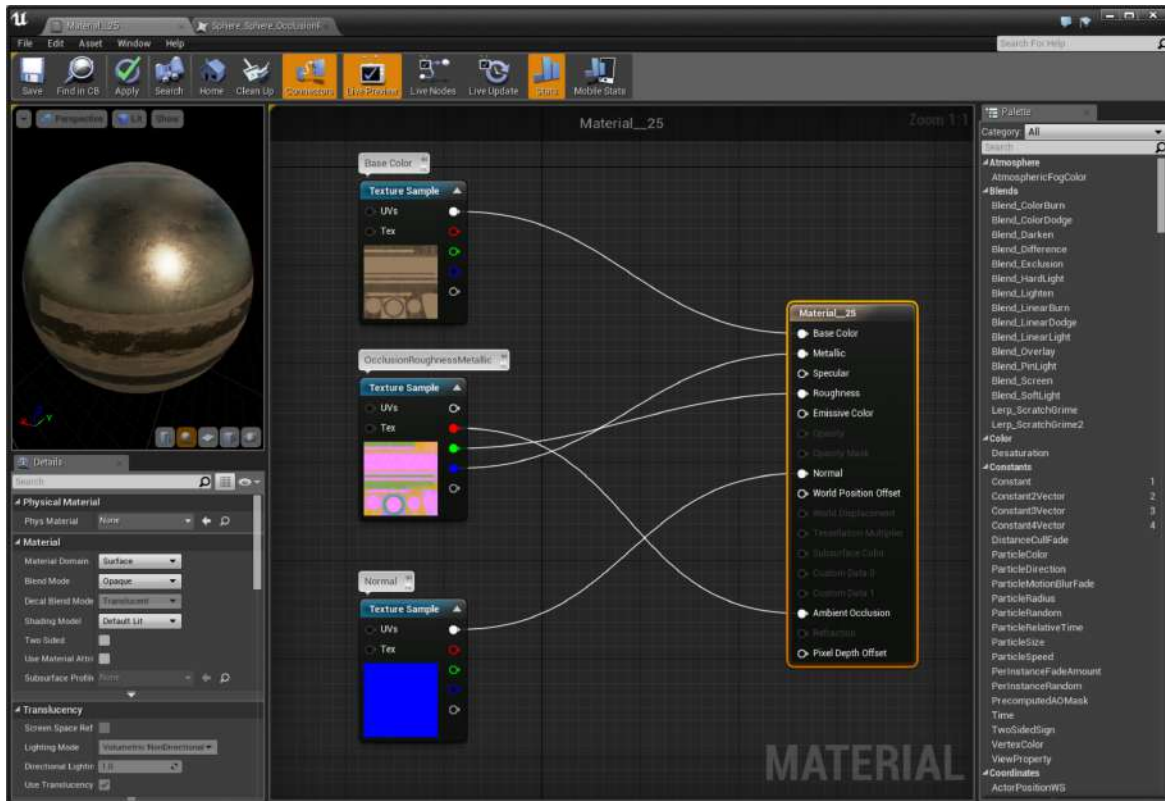
Reflection Environment

For the best results, you need to make sure that your reflection environment is setup correctly. You can find detailed information in the Unreal Documentation.
https://docs.unrealengine.com/latest/INT/Engine/Rendering/LightingAndShadows/ReflectionEnvironment/index.html

1. Create lights in the scene. You can also choose to use a Skylight and set a custom HDRI cubemap (.hdr format) for the Source Type by using SLS Specified Cubemap.

2. Add Reflection Probes.

FBX Mesh Import - Tangent Setup

When using Substance Painter maps with UE4 where the normal is baked in Substance Painter, it's best to use an FBX that does not contain tangents.
When using an FBX in Substance Painter that does not contain tangents, Substance Painter will use mikktspace for the tangent basis. When Importing the FBX into UE4, you should set the Normal Input Method to Import Normals and the normal generation to Mikk TSpace.
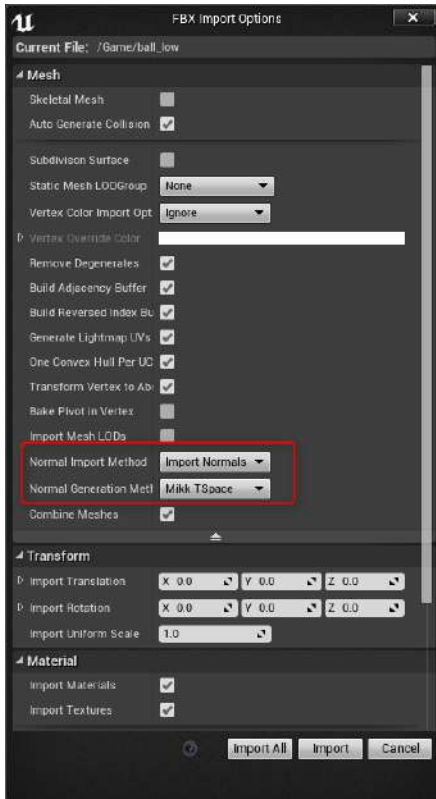
V-Ray for Maya

Maya 2016 Extension 2 - VRay for Maya 3.4

The V-Ray material uses a Diffuse, Reflection, Glossiness workflow. In Substance Painter, you have the ability to work with metallic/Roughess or Specular/Glossiness workflows and these shaders are geared towards real-time usage. However, Substance Painter can export textures for use with V-Ray. By using the V-Ray export preset, Substance Painter will export the converted maps needed to work the V-Ray material. It is recommended to work with V-Ray 3.1 and higher in order to use the GGX BRDF, which will more closely match the Substance Painter viewport.

Download Example Scene

Substance Painter Export

1. In your Project go to File / Export Textures...
2. In the Export Tab, select the Vray Configuration and click Export.

>>
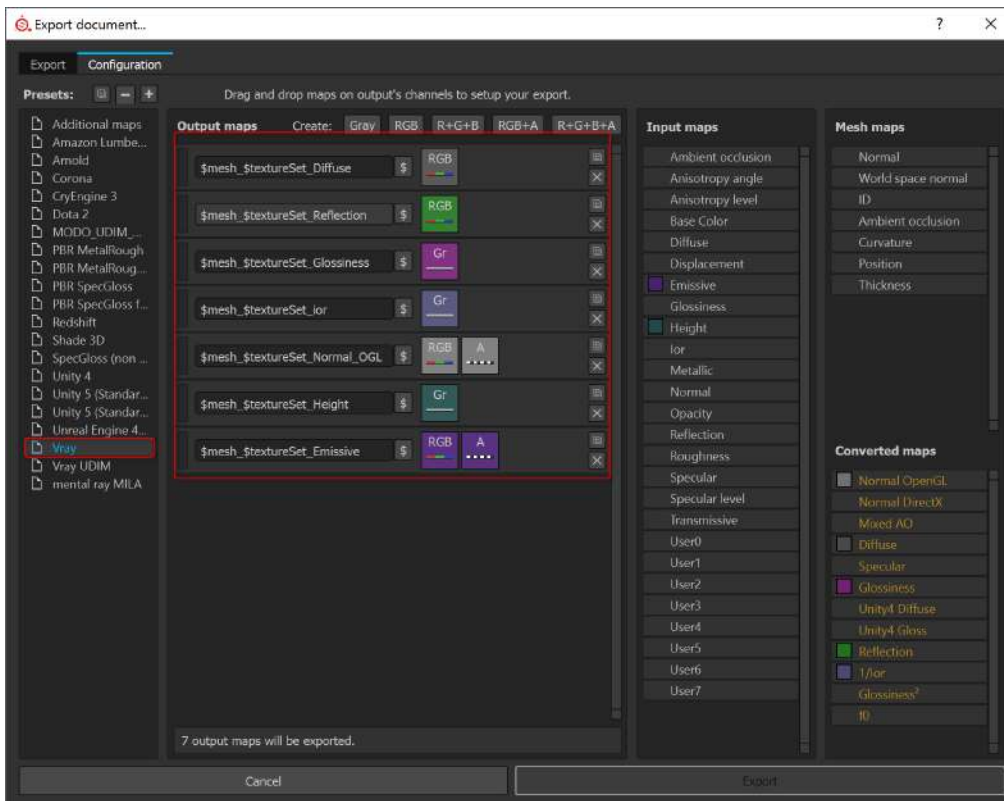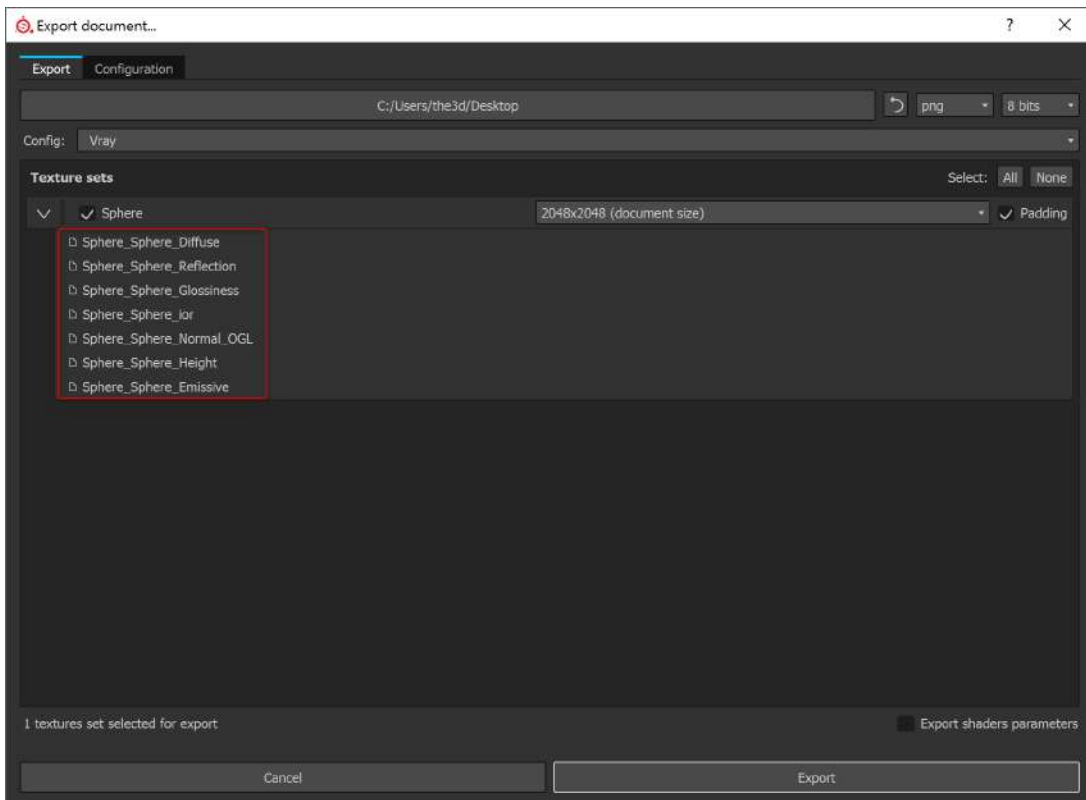
V-Ray Material Setup

1. Create a VRayMtl material
2. Import the textures exported from Substance Painter into Maya
3. Hook up the textures to the input channels as follows...
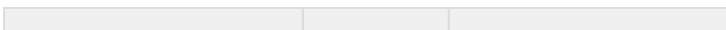
Substance Painter Texture	Colorspace	V-Ray Material Channel
Diffuse	sRGB	Diffuse Color
Reflection	sRGB	Reflection Color
Glossiness	RAW	Reflection Glossiness
IOR*	RAW	Fresnel IOR*
Normal	RAW	Bump and Normal Mapping

Uncheck Lock Fresnel IOR to Refraction IOR
Set the BRDF Type to GGX in the Reflection parameters
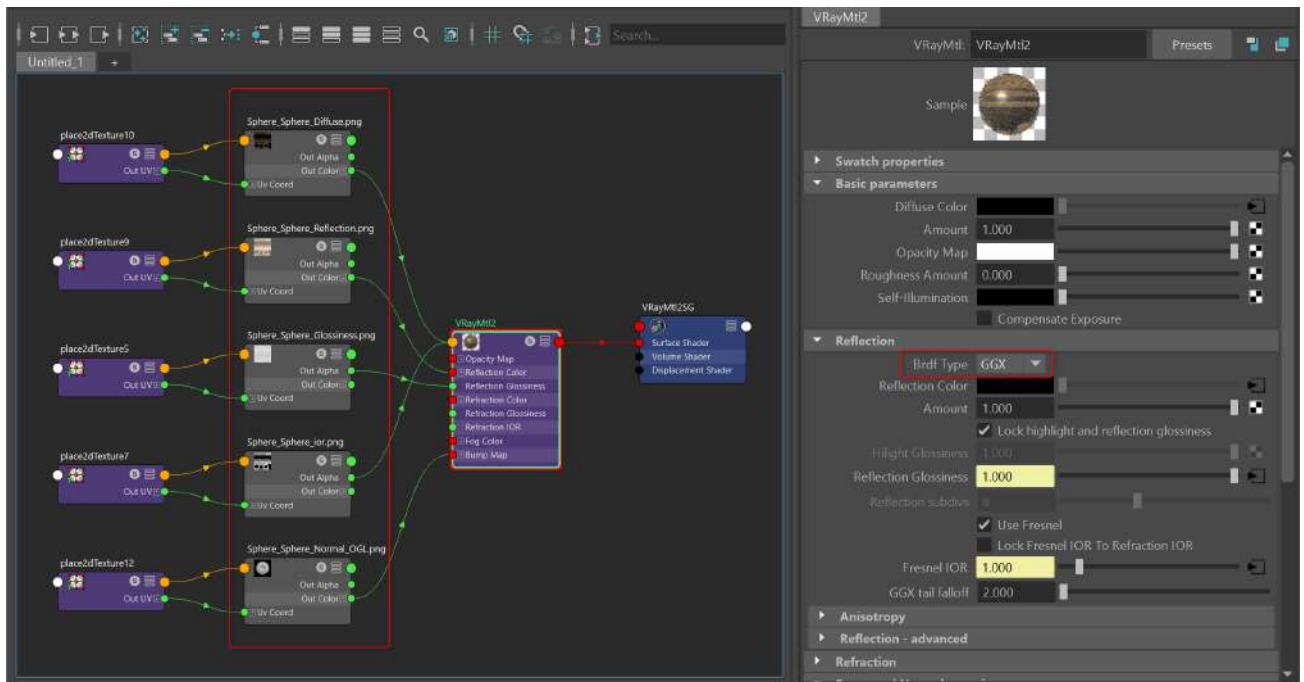
Colorspace

It's important to make sure that textures are interpreted properly for a linear workflow. You can change the colorspace for textures on the Texture2D node. Be sure to set the Colorspace for each map as listed in the above table.

In the V-Ray render settings under Color mapping, use the options shown in the following image.
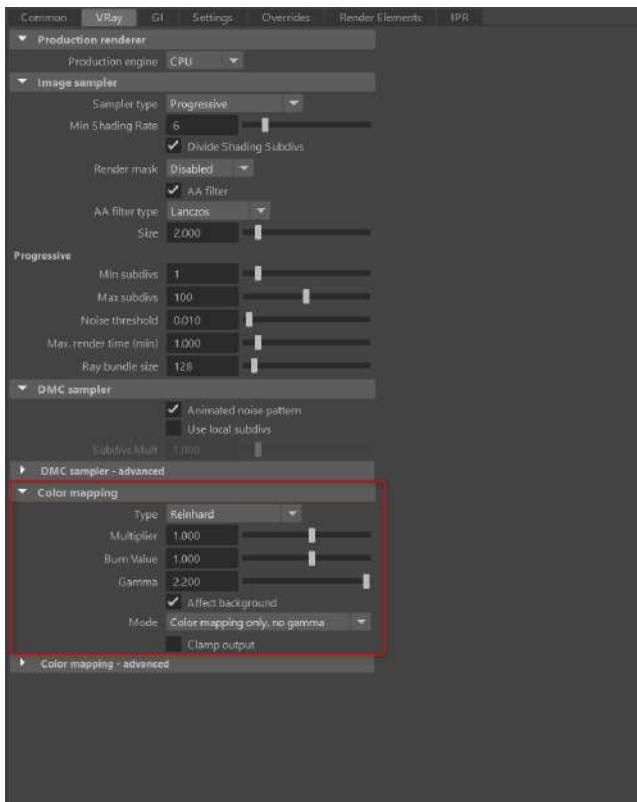
License activation

When launching Substance Painter for the first time, you will encounter the activation wizard (even if you are running the trial version).
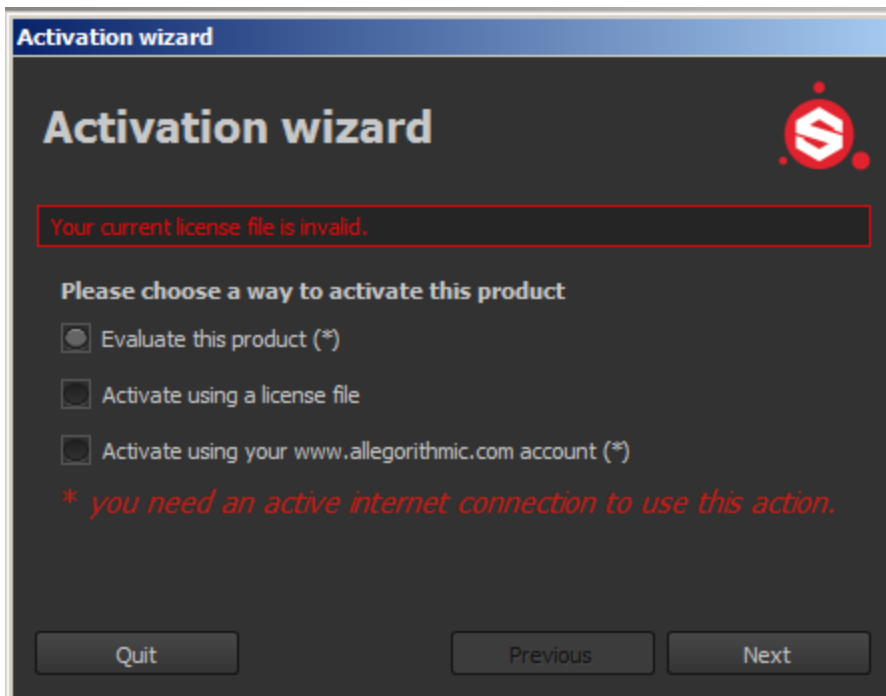
3 choices are available:

- **Evaluate this product**: This will generate a license file based on your hardware which will be valid for the next 30 days.
- **Activate using licence file**: If you downloaded a ***.key** license file from your account page on our website, you will be able to load it in the next step.
- **Activate using your account**: If you choose this option, the next step will ask for a login and a password to be able to automatically retrieve a license file.

> Make sure you are running the software as admin, and to disable your anti-virus.

Manual activation

It is possible to manually activate Substance Painter by putting the license.key file in the following folder:

> **Windows** : C:/Program Data/Allegorithmic/Substance Painter/license.key
> **MacOS** : /Library/Application Support/Allegorithmic/Substance Painter/license.key
> **Linux** : /opt/Allegorithmic/etc/Substance Painter/license.key

Make sure that the file is called **license.key**

Environment variables

The license location can be changed from its default to a custom one by defining an environment variable. This variable must be a direct path to the file itself.
The environment variable to is : *SUBSTANCE_PAINTER_LICENSE*

Advanced configuration and installation

- Floating license

Floating license

Floating licenses can be deployed in two different ways:

Using one file for multiple computers

(Recommended)

1. Put the license.key file in a shared mounted network
2. Set the following environment variable to point to the license:
   - For Substance Painter (2017.1 and above): **SUBSTANCE_PAINTER_LICENSE**
   - For Substance Painter 2: **SUBSTANCE_PAINTER_2_LICENSE**

The variable should point to the file. For example, if the license file is on **H://allegorithmic/licenses/substance_painter.key**, the variable data should be **"H://allegorithmic/licenses/substance_painter.key"**
The software should then launch without requiring any activation.

Release tokens when idle

By default, Substance Painter releases tokens on a multi-users license if the software is idle for 2 hours.

You can change that value with the following environment variable (in seconds): ALLEGO_LICENSE_IDLE_DELAY

Using one license per computer

1. Install the license.key file on each computer, in the following folder:

   > **Windows**: C:/Program Data/Allegorithmic/Substance Painter/license.key
   > **MacOS**: /Library/Application Support/Allegorithmic/Substance Painter/license.key
   > **Linux**: /opt/Allegorithmic/etc/Substance Painter/license.key

2. Open the traffic to 188.166.128.48 (fixed IP of leyfi-stats-staging.allegorithmic.com) on HTTPS port (443).

This method will require to re-install the license files on each computer in case of an update of the license in the future.

Glossary

Substance Painter is a 3D software that relies on a lot of techniques and technical keywords which can be a bit hard to understand on a first encounter.
This page will inventory the most common keywords used by the application alongside a short explanation of the concept behind it.

Keyword	Definition
Additional map	An additional map is a map baked from a mesh that contains informative relative to the mesh. It can be an information of position of an information of occlusion for example.
Alignment	The alignment is how a brush will be oriented toward the 3D mesh when painting.
Alpha	An alpha is a mask that can be used to paint details or complex shapes, for example a bar-code or a logo.
Bake	A bake (or baking) refer to the action of computing information from a 3D mesh and saving it into a Texture based on the UV information of a mesh.
Bit Depth	The bit depth is the amount of information that can be stored in a texture (per color). The higher the number, the better the precision of the information. However performance decrease with high numbers when doing computations.

Brush	A brush is a tool to paint on a mesh. A brush is defined by multiple parameters that control its behavior (such as the size and the opacity).
Camera	The camera is the object that allow to control the position and the direction of where you look at in a 3D or 2D viewport.
Channel	A channel is a texture with a specific behavior. Some channels are used to define the color of a material, some other channel are used to control the behavior light over a surface.
Clone	The clone is a tool used to replicate part of the painting/texture at other location.
Content / Mask	The content and the mask refer to the two main properties of a layer. The content is the actual painting stored in the channels that are contained in a layer, while the mask is used to display/hide the content. A black mask is equal to an invisible content.
Diffusion	The diffusion is a way or generating information outside the UV island of a mesh. It works by bleeding the last pixels near the border of an UV island, creating blurred colors.
Dilation / Padding	On the same idea as the diffusion, the dilation is a way of generating information outside UV island by extending pixels colors.
Effect	An effect is an element that can be added on a layer, either on the content or the mask. Substance Painter support various type of effects such as filters.
Environment	An environment is an image that is used to compute the lighting of a scene, it is a usually an HDR texture that represent a wide range of color information.
Export	The action of exporting is the way of generating flattened textures from the painting realized inside the application. The textures created from the export can be used in other application.
FOV / Field of View	The FOV is the extent of the observable world by the Camera.
Fill	The Fill is an action (which can be an effect or a layer) that can load a color, a texture or even a material over the whole 3D Mesh.
Filter	A filter is a Substance effect that can modify the previous information. For example a blur filter will soften a previous image. Filters can also be more complex and modify a full material.
Filtering	Filtering refer to the way texture are displayed inside a 3D viewport. Most common are nearest (pixels are read as-is, making an image appera blocky up-close) and bilinear (pixels are interpolated, making an image appear blurry up close).
GPU	The GPU (Graphic Processing Unit) is the part of a computer that perform quick computation for producing images.
Generator	A Generator is a Substance that generate new information/images usually based on additional textures. For example some mask generator use baked texture to create complex masks.
Histogram	An histogram is a graphical representation of the distribution of color values. It is used to visualize how colors are balanced inside an image between shadows, midtones and highlights.
Iray	Iray is a path-tracer renderer created by NVIDIA, used to project a realistic lighting over the 3D mesh. Since it is an advanced renderer, it is meant for creating pretty images and not to be use for real-time work.
Jitter	The jitter is a property of the brush to produce random behavior when painting.
Layer	A layer is an element that contains multiple channels with additional property such as a blending mode and an opacity.
Layer stack	A layer stack is a place where layers can be managed and

	organized. Layers are organized from bottom to top. The bottom layer will be drawn first and then each layer above will be added one by one on top of eahc other.
Lazy Mouse	The lazy mouse is a behavior of the brush tool. It slow down the brush path to enhance the precision when painting, created a delay /offset between the mouse cursor and the actual painting.
Level	A level is an effect that allow to control a range or color/grayscale information via an histogram. It can be used to invert color or darken /brighten color for example.
Log	A log is a text file where are wrote information from the software, usually related to the computer running the application.
Low / High poly mesh	A low and a high poly mesh are both 3D mesh, one is with a low density of polygons while the other is with a higher amount of polycount (often 100 times bigger). Usually the high mesh information are baked down to the low mesh.
Material	A material define the properties to represent a specific matter. On a 3D Mesh, the material is also used to define groups of polygon faces.
Mesh	A mesh is a 3D object defined by multiple information. In Substance Painter a mesh is defined by polygons (usually triangles). A mesh can be created in a 3D modeling application such as **Blender** or **Aut odesk Maya**.
Mip-Map	A mip-map is a pre-computed texture, usually present as a sequence of image each time at a lower resolution than the original texture.
Mode	A mode refer to the setup of the interface which gives access to a specific set of tools and controls depending of the mode.
Noise	A noise is a procedural and random image, that usually represent organic shapes and color/grayscale values.
Normal	A normal is a special texture that deform the way a light behave on the surface of a 3D Mesh to simulate details that doesn't exist in the geometry.
OpenGL / DirectX	OpenGL and DirectX are both an application programming interface (API) used for rendering 2D and 3D information. They also define the normal map format.
Orthographic	An Orthographic projection is a means of representing three-dimensional objects in two dimensions in which all the projection lines are orthogonal to the projection plane.
PBR / PBS	Physically based Rendering (PBR) or Physically Based Shading (PBS) is a model in computer graphics that seeks to render graphics in a way that more accurately models the flow of light in the real world.
Packing	Packing is the action of storing multiple images inside one texture. Because textures are composed of separated Red, Green, and Blue channels, they can store different information which can be read independently in an other application.
Particles	Particles are a kind of tool that generate brush strokes based on physical properties or other complex behaviors.
Perspective	Perspective is an approximate representation or a object or scene seen by the human eye on a flat surface (like a screen). It's a simulation of depth and scale.
Pixel / Texel	A pixel is a dot in an image, it is the smallest element possible that contains color information. The bigger the resolution, the more pixels are available allowing a better definition and more details. Texels are pixels inside a texture.
Plugin	Plugins are programming functions (often expressed via scripting) that can be added to the software, extending the possibilities of the application.

Post-Process	A post-process is a visual effect applied on the screen once the 3D image has been rendered, often to simulate special behavior like color correction or bloom.
Procedural	Procedural is a terme to describe process that are generated by a computer based on a series of parameters. It can be simply mathematics results such as numbers or complex images.
Projection	A projection is the action of applying from a specific point of view (such as the Camera) an image/object onto the surface of the 3D Mesh.
Resolution (Power of 2)	The resolution define the size of a texture on its X and Y axis (or width and height). Often in a power of 2 scale (2, 4, 8, 16... 512, 1024, 2048...) because it is optimized for computations on a GPU.
Scripting	Scripting is the act or using specific command via a text based file format to execute specific behaviors.
Shader	A shader define the behavior of a material when it receives lighting information. Some shader can be simple (like toon shading) or more advanced (like skin shading that simulate light absorption in a surface).
Shelf	A shelf is the location in the application where ressource of multiple kind are organized. It can go from simple images to more complex tools.
Smart Mask	Smart Masks behave like smart materials, but instead of being layers, they are effects defined to generate mask only based on the current 3D Mesh.
Smart Material	A smart material is a group of layers saved as one file. Smart material can adapt to each project in Substance Painter, allowing to create materials that will change depending on the current 3D mesh.
Smudge	The Smudge is a tool for bleeding, spreading or mixing colors. It is often used to soften pixels.
Stencil	A stencil is an image aligned to the screen and used with a camera projection to paint on the 3D Mesh.
Substance	A Substance is a file format that allow to generate texture based on a set of parameters (which involve procedural computations). These parameters can be modified to create variations.
Symmetry	The symmetry is an option of a tool that allow to paint at two places at the same time in mirror.
Template	A template is a set of predefined option used when creating a new project. It can define the default resolution or the default baking setting for example.
Texel Ratio	The texel ratio is the rule that compare the size of an UV island (2D) and the geometry of the 3D mesh related to it. A good texel ratio means a even unfolding of the geometry in 2D. This is important to keep the look and the quality of the painting/texturing consistent on the 3D Mesh.
Texture	A texture is a file containing pixels on 2D dimensions defined by a resolution. The pixels can be grayscale or colored. When colored, the pixels can have an information of transparency (if supported by the file format).
Texture Set	In Substance Painter a texture set represent a part of a mesh that has specific UVs to be painted on. The Texture Set is created per unique material detected when importing a 3D mesh.
Tilling	Tilling is the repetition of a texture where seams are not visible at the borders, it is meant to simulate an infinite plane. Example : grass or pavements.
Tool	A tool refer to an action that allow to interact with the 3D Mesh, often to paint or apply effects.

Toolbar	The toolbar is the location where all the icon shortcuts to the tools are available.
UDIM	UDIM is a way or splitting the UVs of a 3D mesh across multiple ranges to increase the general texture resolution.
UV	UV are information defined on a 3D Mesh that indicate how it can be unfolded to become a flat shape. This information is used to project a texture onto a 3D Mesh. Substance Painter only allow to paint in the range 0-1 which represent the size of a texture. Other ranges are only supported via the UDIM system.
VRam	The VRam is the memory of the GPU, used to store information and texture when doing computations. The more Vram the better for working with Substance Painter.
Viewport	The viewport is the place where the 3D or 2D scene is displayed on the screen. This is also where it is possible to interact with the tools and the 3D Mesh by controlling the camera.

Performance

Substance Painter can be very demanding when working in specific conditions (for instance at very high texture resolutions), to ensure a good workflow it is good to know how to work with these constraints. This page regroups tips and tricks on how to maximize performances.

- Conflicts and background applications
- Mesh and UV setup
- GPU Drivers
- Multi/Bi-GPU
- NVIDIA Drivers Settings
- GPU VRAM amount and bandwidth
- GPU VRAM and other applications
- Texture Sets amount
- Layer management
- Channels'management
- Substance filters and materials
- Viewport display

Technical Requirements

Supported GPUs

- Intel HD 5000 / IRis Pro 6200 and above
- NVIDIA GeForce GTX 600
- NVIDIA Quadro K2000 and above
- AMD Radeon HD 7000 and above
- AMD Radeon Pro WX-serie / Pro Duo and above
- AMD FirePro W-series / FirePro S-series and above

- Integrated GPUs are **not** recommended
- Mac: Only official Apple configurations are supported
- Mac: Nvidia Iray renderer requires CUDA drivers to use the GPU
- Linux: Mesa drivers on Linux are not supported

Monitors

Minimum

- Resolution 1 Mega Pixels & width 1280 pixels

Windows

Minimum

- **OS:** Windows 7 / 8 / 10 - (64 bit)
- **Memory:** 8 GB RAM
- **Graphics:** VRAM 2GB
- **DirectX:** Version 11

Recommended

- **OS:** Windows 10 - (64 bit)
- **Memory:** 16 GB RAM
- **Graphics:** VRAM 4GB
- **DirectX:** Version 11

Mac OS X

Minimum

- **OS:** 10.11 (El Capitan)
- **Memory:** 8 GB RAM
- **Graphics:** VRAM 2GB

Recommended

- **OS:** 10.12 (Sierra) or above
- **Memory:** 16 GB RAM
- **Graphics:** VRAM 4GB

Linux

Minimum

- **OS:** CentOS 6.6 or Ubuntu 12.4 (Steam)
- **Memory:** 8 GB RAM
- **Graphics:** VRAM 2GB

Recommended

- **OS:** CentOS 6.6 or Ubuntu 16.4 (Steam)
- **Memory:** 16 GB RAM
- **Graphics:** VRAM 4GB

Interface
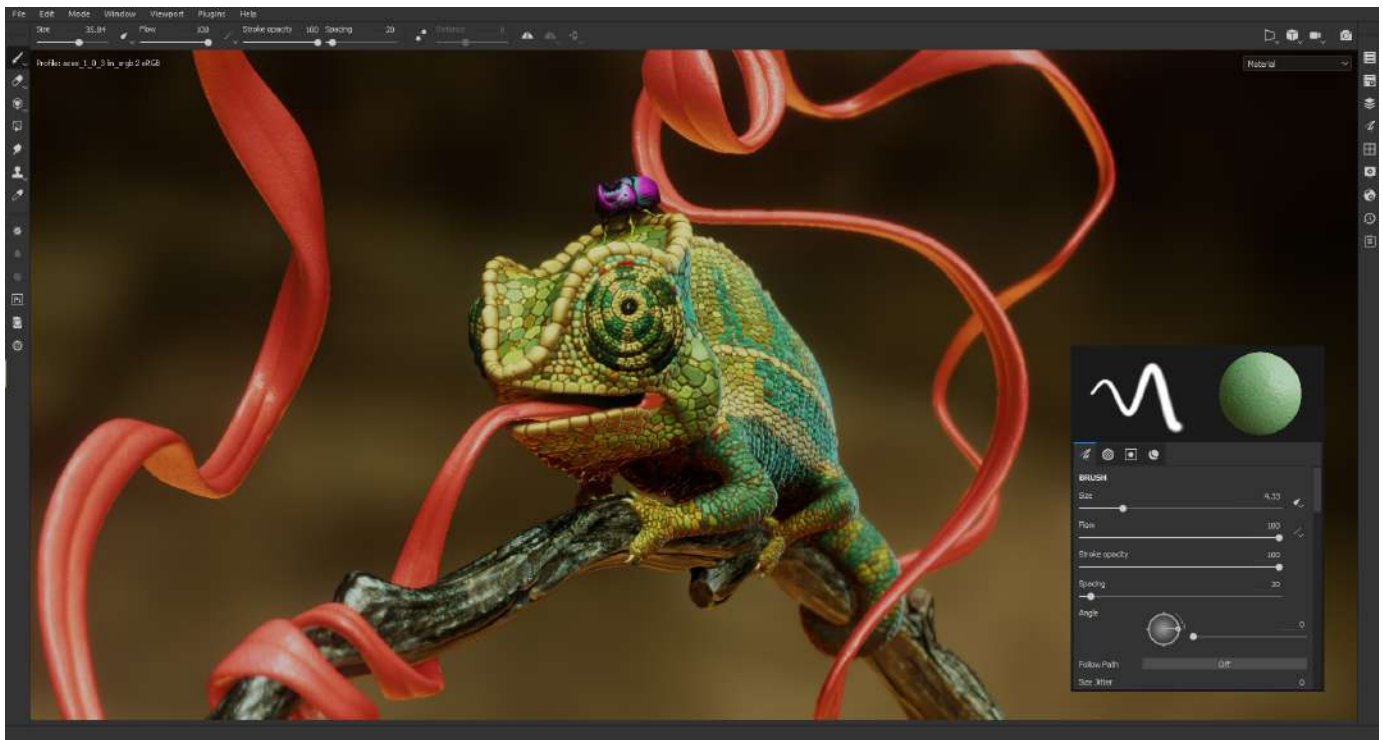
The interface of Substance Painter is divided in several panels, that you can reorder, resize, display and even hide:

- Main menu
- Settings
- Project configuration
- Toolbars
- Viewports
- Texture Set
- Layer stack
- Shelf
- Viewer Settings
- Display Settings
- Sliders

List of shortcuts:

- Shortcuts

Main menu
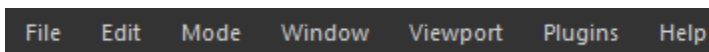
Located above the toolbar, the main menu allow to access the basic functions of the application :

- File menu
- Edit menu
- Mode menu
- Window menu
- Plugins Menu
- Help menu
- Viewport

File menu
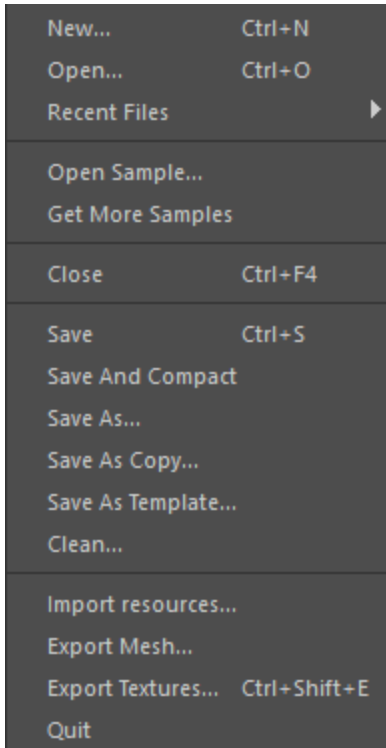
The file menu contains the actions for creating and saving the projects and as well the actions for exporting and importing resources into a project.

- **New**: Create a new Substance Painter project.
- **Open**: Open a Substance Painter project.
- **Recent files**: Display a list of the recently opened projects.
- **Open Sample**: Shortcut to open sample projects shipped with Substance Painter (Meet Mat, Preview Sphere and Tiling Material).
- **Get More Samples**: Shortcut to Substance Share projects page : https://share.allegorithmic.com/libraries?by_category_id=72
- **Close**: Close the current open project.
- **Save**: Save the current open project, if it is a new project it will call **Save As** instead.
- **Save And Compact**: Save the current project, it is slower but resulting in more compact size of the file.
- **Save As**: Allow to save a project with a specific name.
- **Save As Copy**: Allow to save a project with a specific name while keeping the current one open.
- **Save As Template**: Save the current project settings (current texture set settings, baker settings and shader) into a template file that can be used for a new project.
- **Clean**: Remove any unused resources from the current project (it will take effect after the next **Save**).
- **Import resource**: Open the import resources window.
- **Export textures**: Open the export window that allows to export you current project as bitmap textures.
- **Quit**: Close Substance Painter. It will ask to save the current project if some information are unsaved.

Edit menu
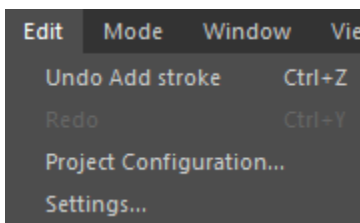
The edit menu allows to access quickly the undo/redo actions but also to access the project settings and the global settings.

- **Undo**: Go one step back in the history stack (available in the texture set settings)
- **Redo**: Go one step forward in the history stack (available in the texture set settings)
- **Project configuration**: Open the project settings window of the current project
- **Settings**: Open the global settings window of Substance Painter

Mode menu
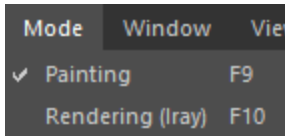
The mode menu allows to switch the interface of Substance Painter between different modes, each one having a dedicated purpose:

- **Painting**: This mode allows to work over the 3D mesh and to manipulate the layer stack.
- **Rendering** (Iray): This mode allows to switch to the Iray renderer with the current project. See the dedicated page : Iray Renderer

Window menu
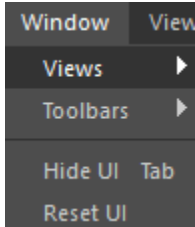
The window menu allows to display a list of the windows and if they are visible in the interface. You can also use the toolbar menu to hide some toolbars.

- **Views**: Lists the windows available in the interface (the checkbox indicate if it is currently visible).
- **Toolbars**: Lists the toolbars available in the interface (the checkbox indicate if it is currently visible, which allows to toggle them): Docks, Plugins & Tools.
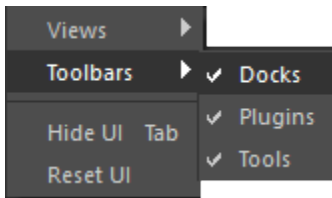
- **Hide UI:** Hides all the panels of the interface and maximize the viewport(s).
- **Reset UI**: Resets the current window layout to default.

Plugins Menu
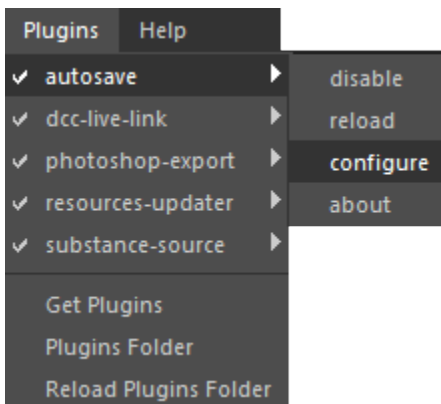
> To find more information about the default plugin shipped with Substance Painter or how to create a new one, see the dedicated page: Plugins

The plugins menu lists all the available plugins that are loaded by Substance Painter at startup. You can find more plugins on Substance Share. Each plugin discovered by the application will add an entry in the menu to access further functions:

- **disable/enable**: changes the status of the plugin

- **reload**: allows to reload the plugin in case the script changed while the application was running
- **configure**: if supported by the plugin, displays the function to configure the plugin
- **about**: if supported by the plugin, displays information about the plugin

Help menu
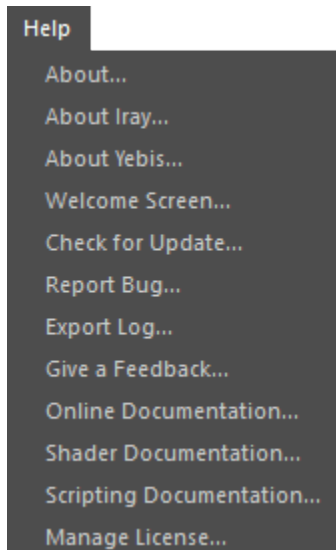
The help regroups various functions. From links to the documentation to the classic about window.

- **About**: Displays information about Substance Painter. Such as the current version number.
- **About Iray**: Displays information about Iray, the render system used by Substance Painter.
- **Welcome Screen**: Displays the welcome screen window, listing various links and shortcuts.
- **About Yebis** : Displays information about Yebis, the post-processing system used by Substance Painter.
- **Check for Update**: Allows to see if new versions of Substance Painter are available.
- **Report bug**: Allows to send a bug report to Allegorithmic's server (with an attachment).
- **Export log**: Exports the log file of Substance Painter. Very useful if you need to report a bug on Allegorithmic's forum.
- **Give a feedback**: Link to our uservoice web page. See http://allegorithmic.uservoice.com.
- **Online documentation**: Link to the documentation of Substance Painter.
- **Shader documentation**: Offline documentation included with Substance Painter for our custom shader system.
- **Scripting Documentation**: Offline documentation for the scripting/plugin system included with Substance Painter.
- **Manage license**: Allows to display information about your license and change it if necessary.

Viewport

It displays the following shortcuts:

- M: Displays material.

- C: Displays next channel
- Shift+C: Displays previous channel
- B: Displays next mesh map
- Shift+B: Displays previous mesh map
- F: Enables the quick mask
- Y: Edits the quick mask
- I: Inverts the quick mask

Settings

You can access the global Preferences of Substance Painter in the menu **Edit** > **Settings**.
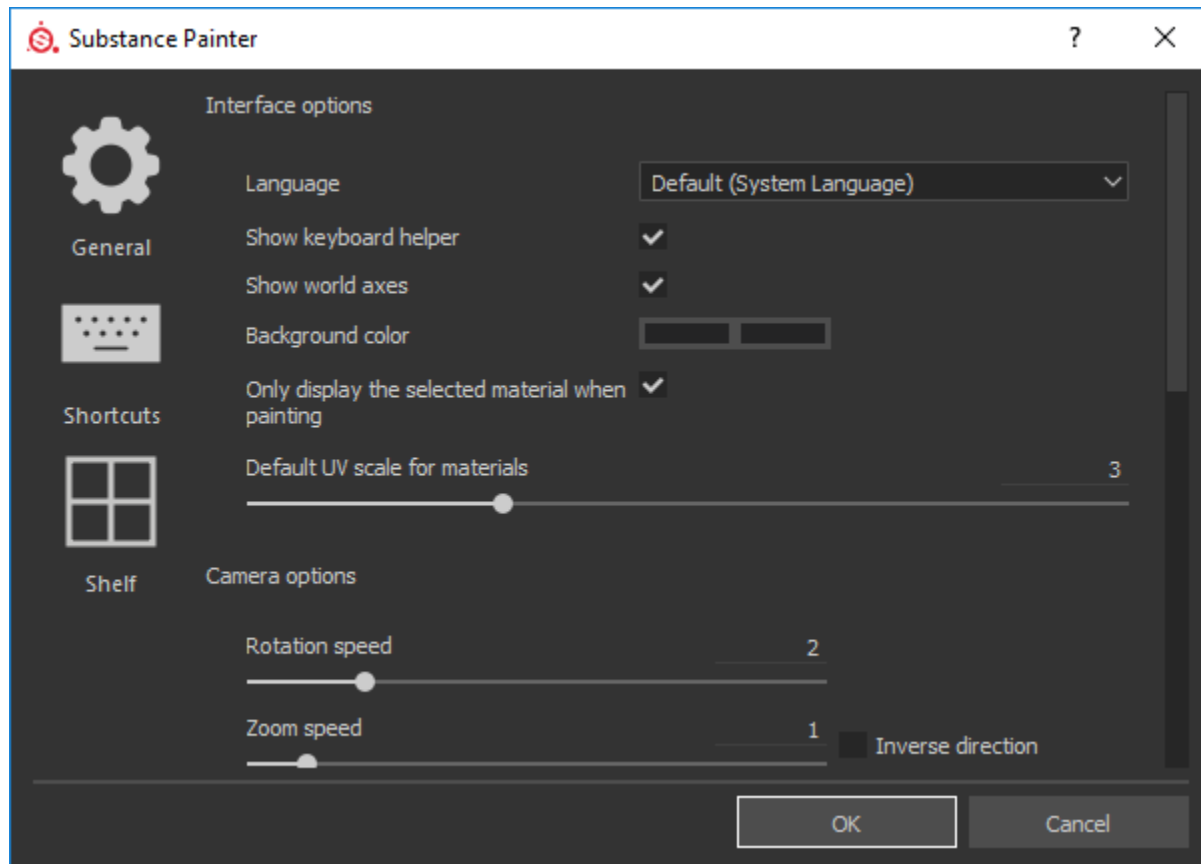
Preferences sections :

- General
- Shortcuts
- Shelfs

General
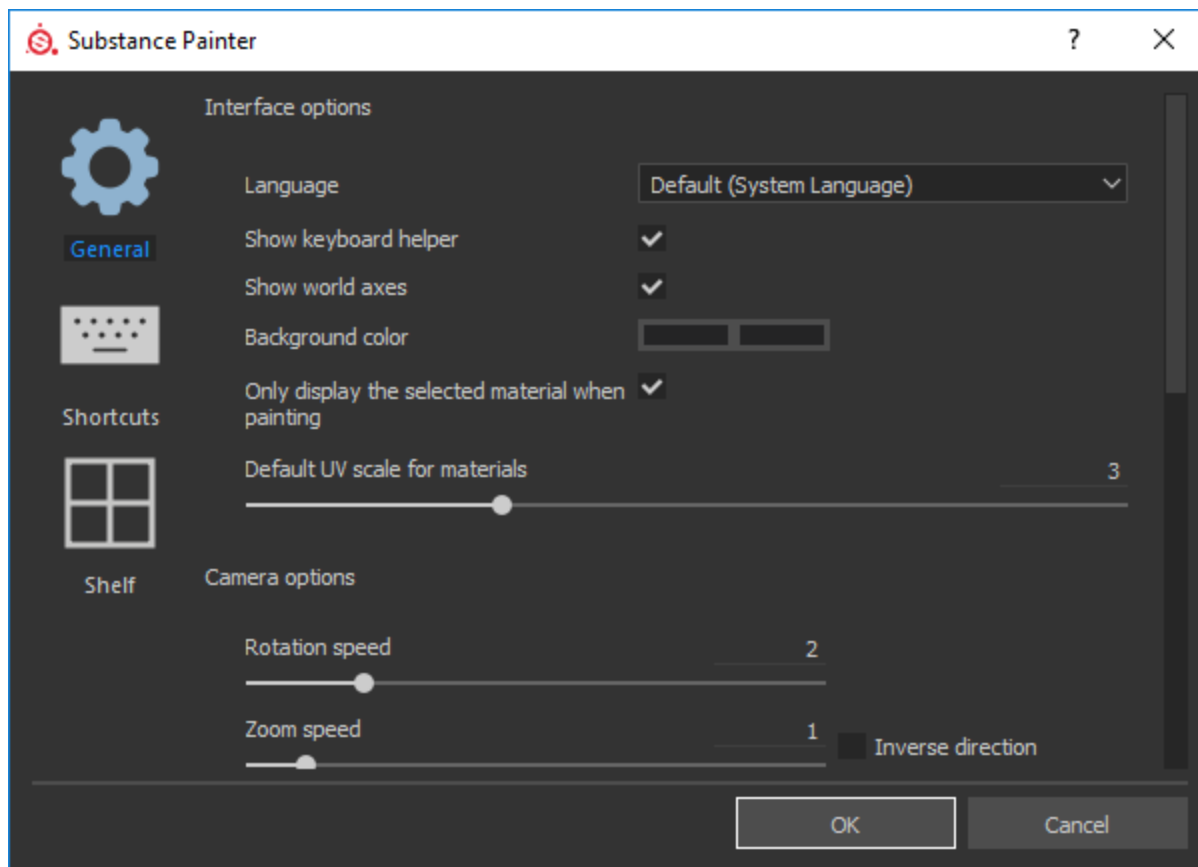
Interface options

- **Language**: Chooses the language of Substance Painter. Please note that you will be invited to restart Substance Painter to take it into account.
- **Show keyboard helper**: If enabled, displays the keyboard shortcuts at the bottom left of the viewports.
- **Show world axes**: If enabled, shows the world axis in the bottom right of the 3D view.
- **Background color**: Chooses the color of the gradient used as a background for the viewports.
- **Only display the selected material when painting**: If enabled, only the Texture Set currently selected will be displayed when painting, hiding the other Texture Sets.
- **Default UV scale for materials**: Define the default tilling value when creating a Fill Layer

Camera options

- **Rotation speed**: Multiplier of the default rotation speed of the viewport's camera.
- **Zoom speed**: Multiplied of the default zoom speed viewport's camera (default zoom). Inverse direction allows to invert the direction of the zoom based on the mouse movement.
- **Wheel speed**: Multiplied for the zoom speed of the mouse wheel (wheel zoom). Inverse direction allows to invert the direction of the zoom based on the wheel movement.

Baking options

- **Save preprocessed scene files**: If enabled, pre-processed high-poly meshes used by the bakers will be saved on disk for future re-use. This feature allow to re-bake more quickly.

Preview options

- **Local cache directory**: Define the location of where shelf thumbnails are located when generated.
- **Local cache budget (in MB)**: Define the maximum size of the cache.
- **Material preview shader**: It is possible to select here the shader that will be used to generate the thumbnails of the shelf. This is usefull if the resources use a different workflow than the default PBR Metallic/Roughness. Please note that you will be invited to restart Substance Painter to take it into account.

Iray hardware

- This section lists all the compatible resource available and that can be used when rendering with **Iray**. The CPU setting is available on all the computer. If the computer has a NVIDIA GPU with a version of CUDA compatible, it will also be listed here. It is possible for example to disable the CPU and render only on the available GPU(s).

Privacy

- **Automatically send usages statistics to Allegorithmic** : If enabled, it will send information to Allegorithmic's server about your hardware configuration along other usage data. All those data are sent anonymously.

Shortcuts

You can view and/or modify all the proposed keyboard and mouse shortcuts in this panel. Click on the "pen" icon next to a shortcut to edit it (and enter you new combination).

You can reset or clear a shortcut by right-clicking on it.
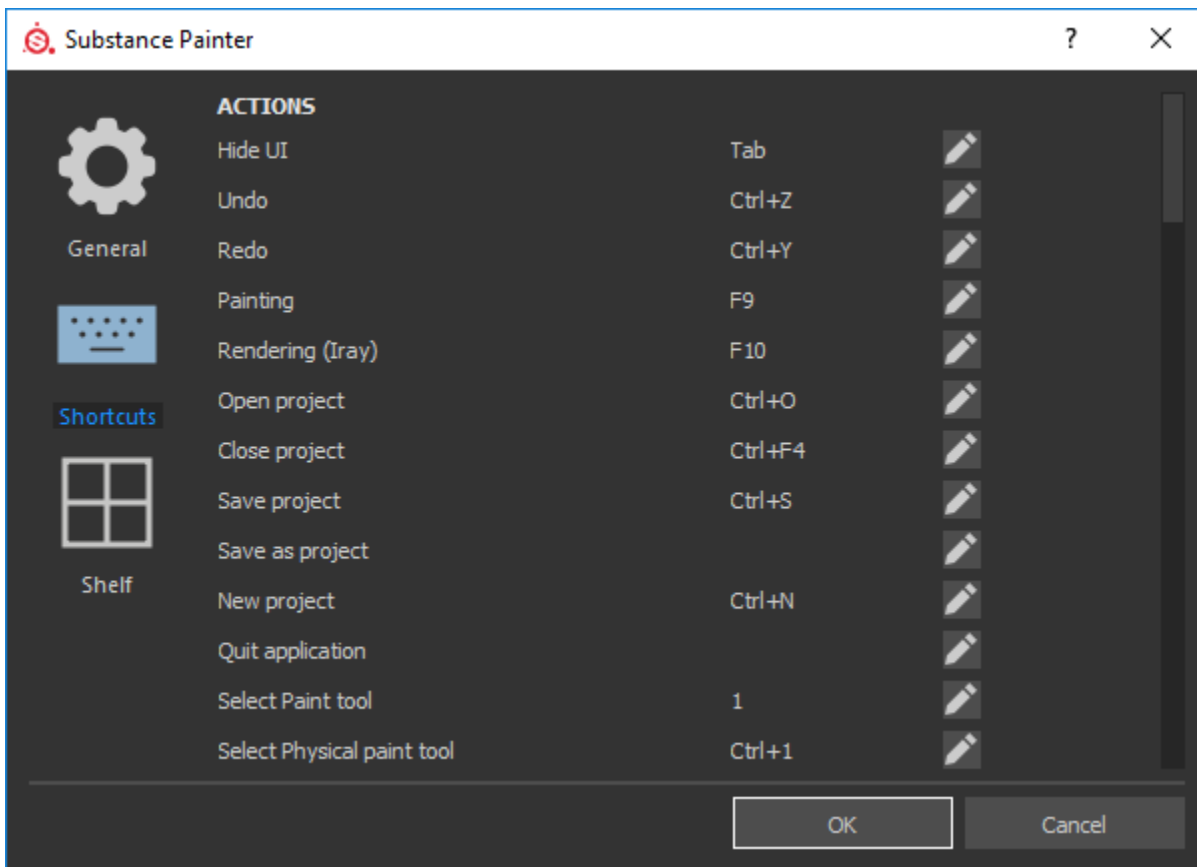
Editable shortcuts :

Action	Shortcut (Windows)	Shortcut (MacOS)	Description
Hide Interface	Tabulation	Tabulation	Hide all the panels of the interface to maximize the viewport(s).
Undo	Ctrl+Z	+Z	Cancel the last action and go back to the previous one.
Redo	Ctrl+Y	+Y	Go forward in the action list, redoing the action that has just been cancelled.
Mode Painting	F9	F9	Switch the interface to the Painting mode.
Mode Rendering (Iray)	F10	F10	Switch the interface to the Rendering mode.
Open project	Ctrl+O	+O	Open the Operating System File

			open dialog to load a project.
Close project	Ctrl+F4	+W	Close the currently opened project.
Save Project	Ctrl+S	+S	Save the currently opened project.
Save As Project		Shift++S	Save the currently opened project. under a new name.
New project	Ctrl+N	+N	Open the new project creation window.
Quit Application		+Q	Close Substance Painter.
Increase tool size	]	]	Increase the size of the brush for the painting tool.
Decrease tool size	[	[	Decrease the size of the brush for the painting tool.
Invert grayscale tool	X		Invert the current grayscale value if the painting tool is on a mask.
Pick stroke material	P	P	Enable the material picker tool.
Symmetry	L	L	Enable the symmetry along a given axis.
Lazy Mouse	D	D	Enable the lazy mouse behavior on the current tool.
Camera Perspective	F5	F5	Change the camera of the viewport to a Perspective view.
Camera Orthographic	F6	F6	Change the camera of the viewport to an Orthographic view.
Display next channel	C	C	Switch the viewport to the Solo view mode and display the next channel of the current Texture Set.
Display material	M	M	Switch the viewport to the Material rendering mode.
Display next additional map	B	B	Switch the viewport to the Solo view mode and display the next additional map of the current Texture Set.
Toggle particles animation	Space	Space	Pause/Unpause animation of the particles if a particle projection is in progress.
Export textures	Ctrl+Shift+E	Shift++E	Open the export textures window.
Center the whole mesh	F	F	Center the whole mesh of the current project in the middle of the viewport.
Toggle quick mask edition	T	T	Enter/Exit the quick mask edition.
Clear quick mask	Y	Y	Disable and clean the quick mask.
Invert quick mask	I	I	Invert the current values of the quick mask.
Viewport layout 3D/2D	F1	F1	Change the viewport display to show the 3D and 2D view.
Viewport layout 3D only	F2	F2	Change the viewport display to show only the 3D.
Viewport layout 2D only	F3	F3	Change the viewport display to show only the 2D.
Texture set isolate	Alt+Q	Option+Q	
Select Paint tool	1	1	
Select Paint tool + Particles	Ctrl+1	+1	
Select Eraser tool	2	2	

Select Eraser tool + Particles	Ctrl+2	+2	
Select Projection tool	3	3	
Select Projection tool + Particles	Ctrl+3	+3	
Select Polygon Fill	4	4	
Select Smudge tool	5	5	
Select Clone tool (relative source)	6	6	
Select Clone tool (absolute source)	Ctrl+6	+6	
Use tool / paint	Mouse left	Mouse left	
Draw straight lines	Shift+Mouse left	Shift+Mouse left	
Draw straight lines with snapping	Ctrl+Shift+Mouse left	Ctrl+Shift+Mouse left	
Camera rotate	Alt+Mouse left	Option+left	
Camera snap rotate	Alt+Shift+Mouse left	Shift++Mouse left	
Camera translate	Alt+Middle mouse	Option++Mouse left	
Camera translate (alternative)	Ctrl+Alt+Mouse left		
Camera zoom	Alt+Mouse right	Mouse middle	
Stencil rotate	S+Mouse left	S+Mouse left	
Stencil snap rotate	Shift+S+Mouse left	Shift+S+Mouse left	
Stencil translation	S+Middle mouse		
Stencil zoom	S+Right mouse	S+Right mouse	
Change tool Size / Hardness	Ctrl+Mouse right	+Mouse right	
Change tool Flow / Rotation	Ctrl+Mouse left	+Mouse left	
Rotate environment	Shift+Mouse right	Shift+Mouse right	
Depth of Field Auto-Focus	Ctrl+Middle mouse		
Texture set selection	Ctrl+Alt+Mouse Right	Option++Mouse right	
Context menu	Quick menu	Quick menu	
Set Clone tool source location	V+Mouse left	V+Mouse left	
Ignore stencil mask	W	W	

Non-Editable shortcuts :

Some shortcuts may **only work** if the **mouse is over** the specific window. For example : **copy** and **pasting** requires that the mouse is **over the layer stack**.

Action	Shortcut (Windows)	Shortcut (MacOS)
Copy layer	Ctrl+C	+C
Cut layer	Ctrl+X	+X
Paste layer	Ctrl+V	+V
Delete layer	Delete	Delete
Duplicate layer	Ctrl+D	+D
Group layer	Ctrl+G	+G
Copy layer content	Ctrl+Shift+C	Option++C

Paste layer content	Ctrl+Shift+V	Option++V
Display mask in viewport	Alt+Mouse left	Option+Mouse left
Disable/Enable mask	Shift+Mouse left	Shift+Mouse left

Shelfs
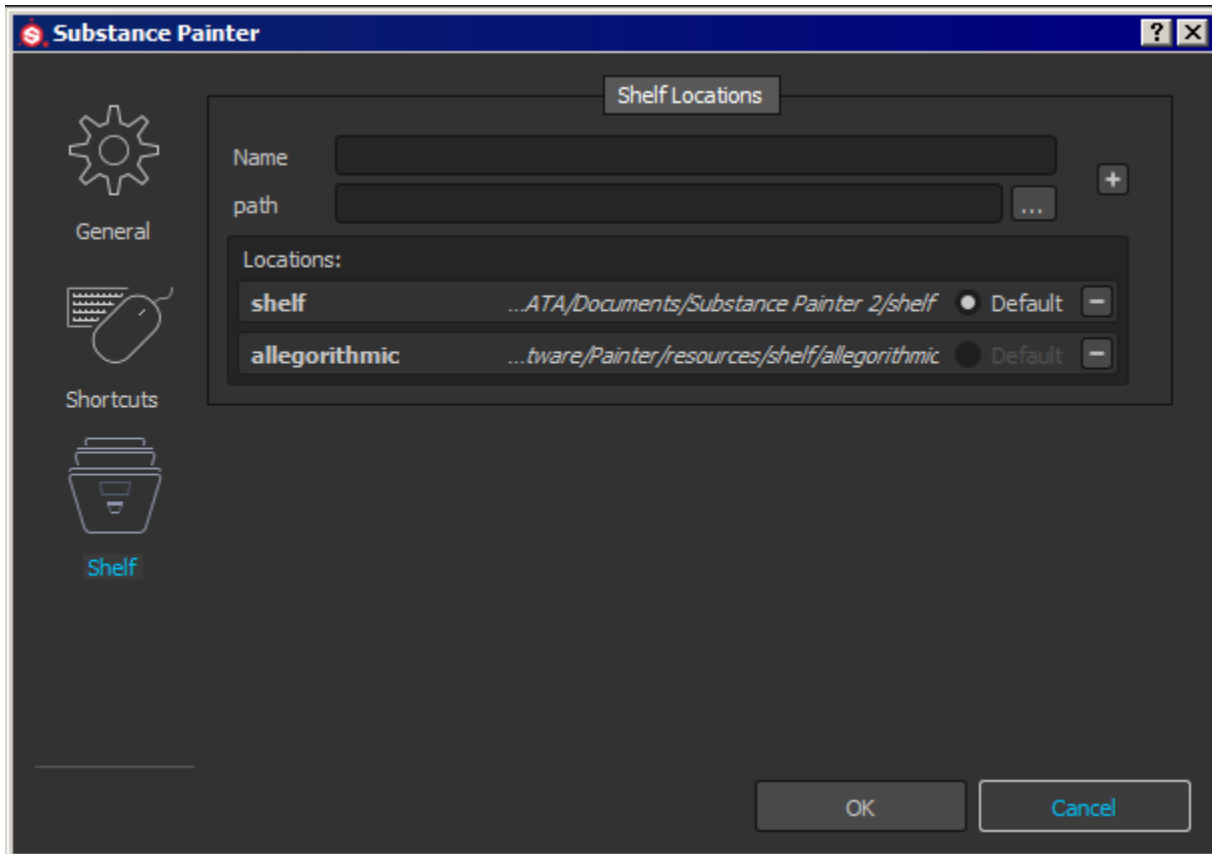
This panel allow you to indicate custom paths to additional shelf folders.
By default only the shelfs shipped with Substance Painter will be available.

> A path can only be created/modified if no projects are currently open.

By default two shelf are pre-installed :

- **shelf** : This is the empty shelf located in the user Documents folder when new resource are created by default.
- **allegorithmic** : This is the shelf containing the default content shipped with Substance Painter

The "**default**" radio button is used to define in which shelf Substance painter is allowed to create new content (such as Brush presets, Material presets or Smart Materials).

Adding a new shelf path

- **Name** : The named that will be used to reference your shelf in the interface Substance Painter (when right-clicking on a resource).
- **Path** : This is the path to the custom shelf that you want to add, click on the button on the right to parse to the folder that you want.

You can add a new shelf by clicking on the [+] button. Once you do that, Painter will create the sub-folders needed for organizing the data in the right tabs of the shelf.

You can remove a shelf by clicking on the [−] button. Note : using this button will **not** remove any content on the disk.

Adding a new path will create the necessary folders and sub-folders structure automatically. From there you can put content in the sub-folders as you would do in the default shelf. See : Adding content to the shelf

Project configuration
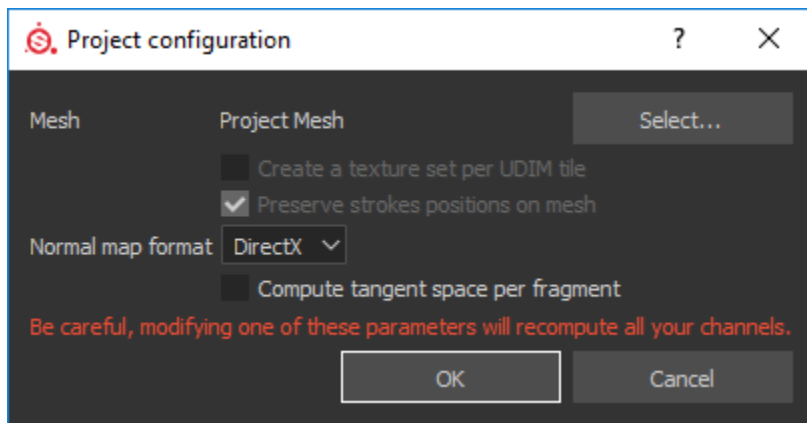
The project setting windows allows to modify few properties related to the current project such as the reloading of a new mesh.

Normal map format

The dropdown "**normal map format**" allows to specify the normal map space used by the project. OpenGL (Y+) and DirectX (Y-) are available. The "**compute tangent space per fragment**" is used to compute and display the normal map. If enabled, the tangent and binormals of the mesh will be computed in the pixel shader.

- Unity requires this setting to be disabled.
- Unreal Engine 4 requires this setting to be enabled.

Mesh reloading

The mesh reloading allows to update your mesh at any moment. This allows to:

- Update the mesh topology
- Update the mesh UVs
- Add or Remove texture sets

The checkbox "**Preserve strokes positions on mesh**" is here to indicate if you are actually updating the size of the mesh or not in order to know how to reproject your strokes and effects properly. For more information on how the reprojection system works, see : UV Reprojection

When reloading a mesh if the materials changed or have been renamed, the previous texture sets in the project can be disabled. This can be fixed with the Reassignment Window for the **Texture Set List**.

UDIM

The setting "**Create a texture set per UDIM tile**" works the same way as when creating a new project. See the UDIM documentation.

Toolbars

Contextual Toolbar

A toolbar on top of the viewport displays shortcuts to commonly used settings of the currently selected tool:
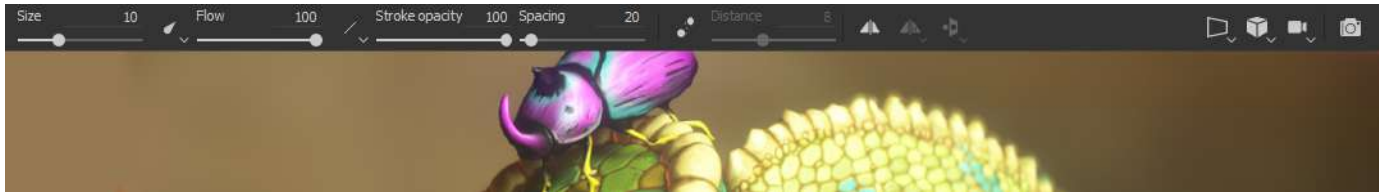
 if polygon fill selected, the contextual toolbar displays the following options:
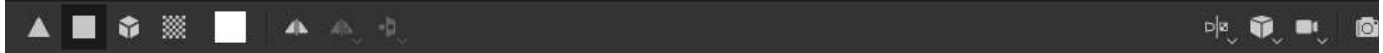
This bar also contains viewport options as well as shortcuts to the Render mode:

Substance Share / Substance Store

The Substance Share icon can be used as a shortcut to open a Substance Share webpage and log you into your account automatically. https://share.allegorithmic.com/

The Substance Store icon can be used as shortcut to open the Substance Store webpage and log you into your account automatically. https://store.allegorithmic.com/

Painting Toolbar

- Paint
- Eraser
- Projection

- Polygon fill
- Smudge
- Clone
- Material picker

Painting Tools

There are multiple type of painting tools available in Substance Painter.
Below is a brief overview, you can read more details about those painting tools on the dedicated page : Painting Tools
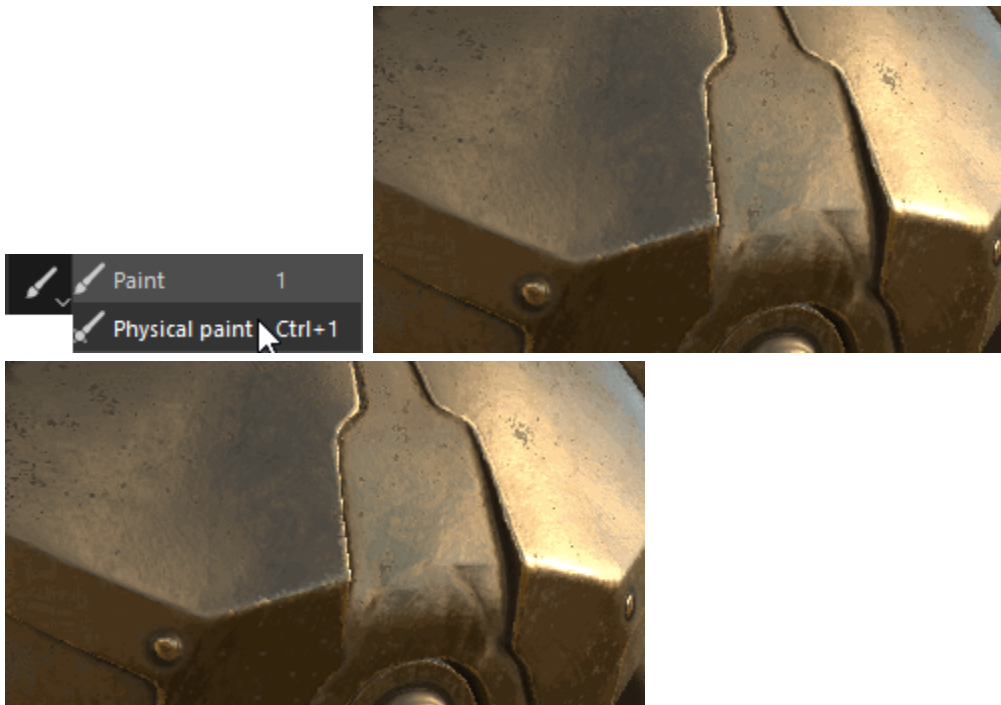
- **Paint** : Regular paint tool based on brush presets that can be used on layers/masks.
- **Physical Paint** : Paint tool with physics properties based on particles presets.
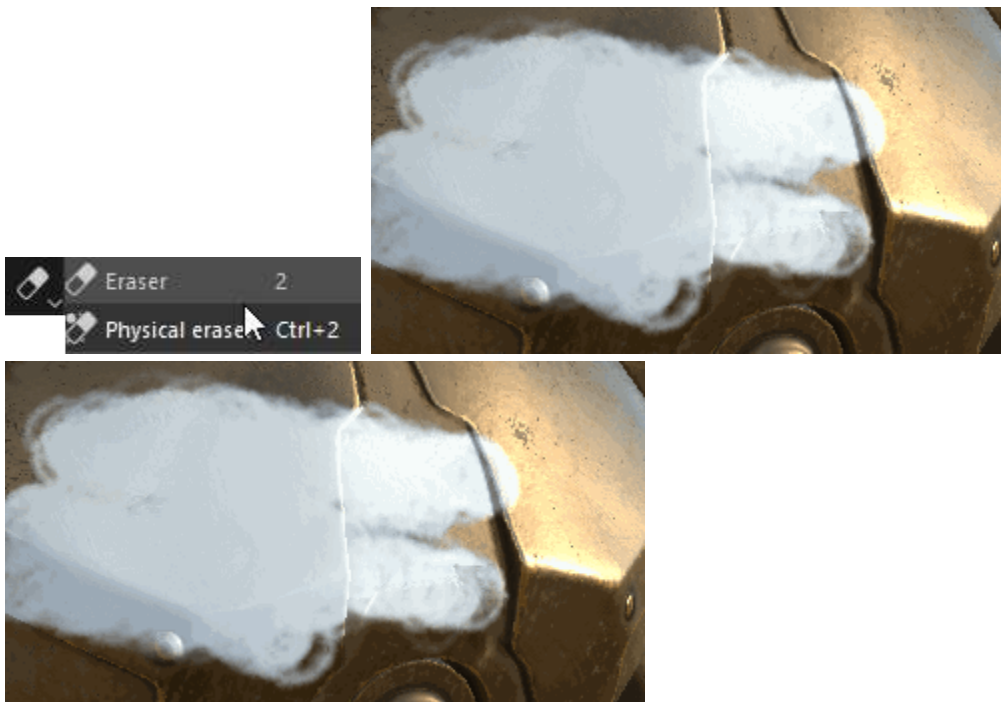
- **Eraser** : Special Paint too to remove content on a layers/masks.
- **Physical Eraser** : Paint eraser with physics properties based on particles presets.
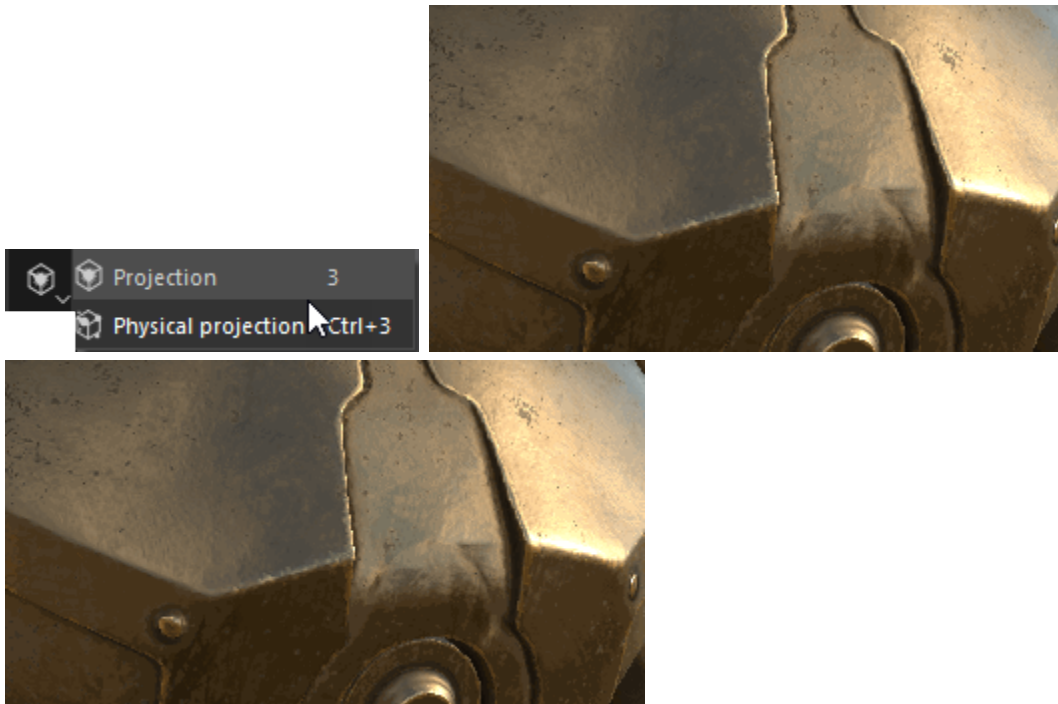
- **Projection** : Paint tool based on screenspace projection. This tool will display and repeat a pattern over the viewport.
- **Physical projection** : Projection paint tool with physics properties based on particles presets.

- **Polygon fill** : Paint tool that works by selecting the geometry of the mesh either via vertices, triangles, continuous mesh parts or UV islands.

Material Picker

The Material picker allow to quickly retrieve a full material set of values from any point over the 3D mesh present in the viewport. The picker will load all the channel available under the mouse click into the current tool. This tool doesn't work on fill layer.

Lazy Mouse

The Lazy mouse adds a distance behind your current brush. This creates a sort of delay that allows more precise brush strokes. The distance can be changed with the slide next to the button. The distance is computed in screen-space.

Symmetry Tools

Choose on which axis you want to use a symmetry when performing brush strokes.
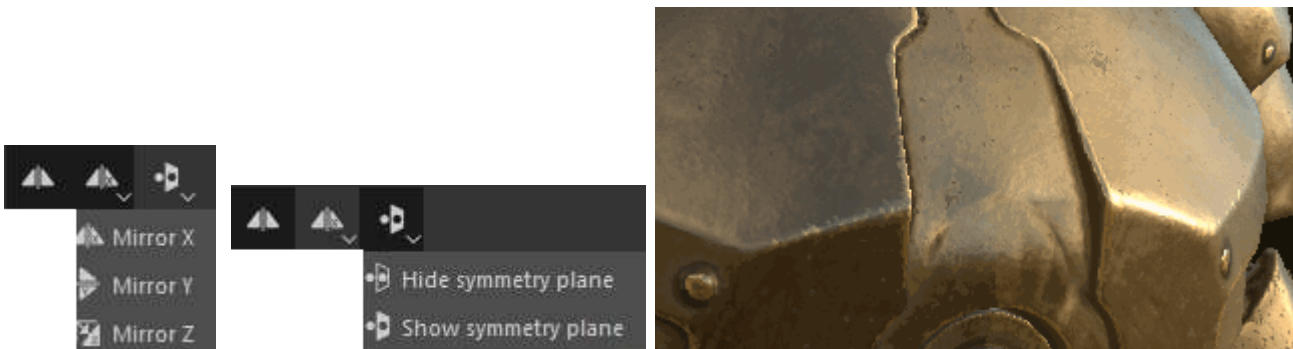
Viewport layout

Choose which layout to display between the 3D View, the 2D View, or both at the same time.
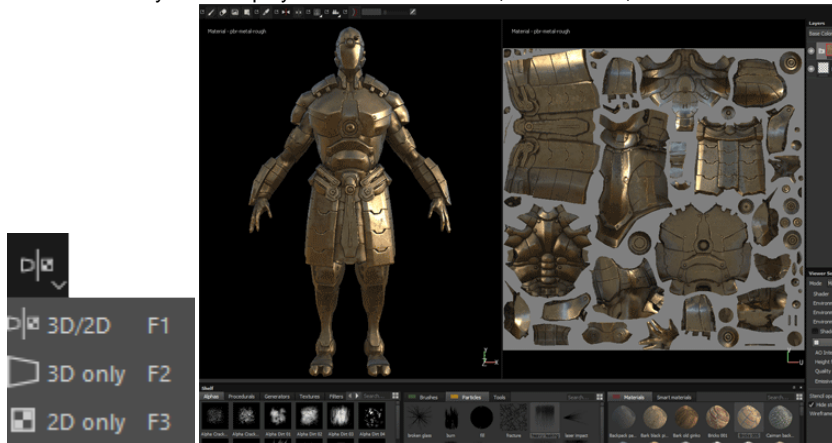
Camera Tools

Switch between constrained rotation (rotation on two axis only) and free rotation (rotation on three axis) for the viewport camera in the 3D View.
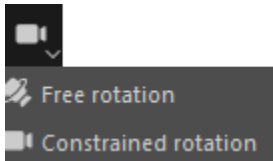
Viewports
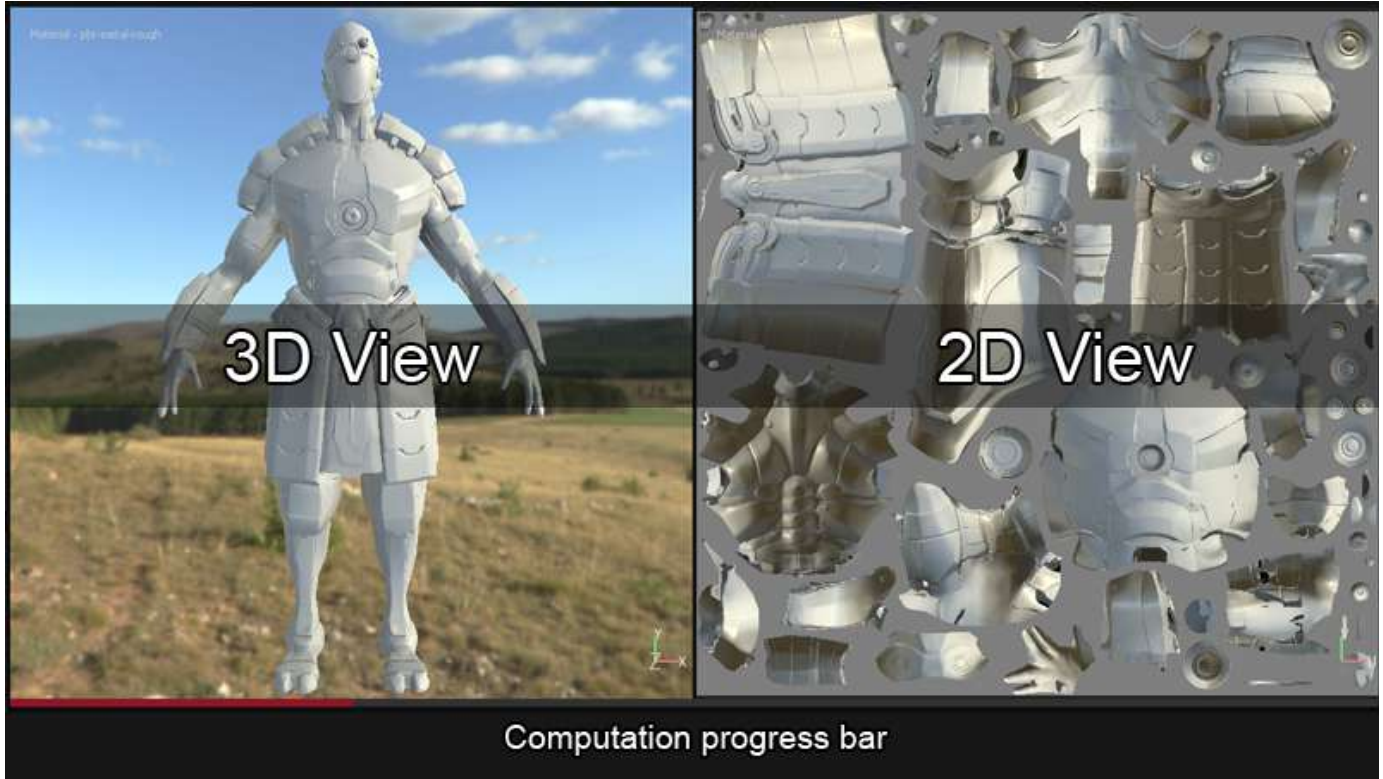
Substance Painter has two viewports : a 3D and a 2D view. Both views allow to paint on your 3D mesh. Both views also offer the possibility to visualize your texture under a lighting.
At the bottom of the viewports you can see a gray line that sometimes turns red. It's a computation bar that indicate the progress of something the engine of Painter is computing.

You can cycle between different layouts for the views via the following toolbar icons (and their associated keyboard shortcuts) :
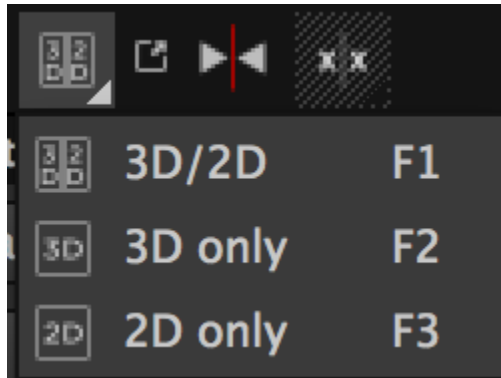
2D View

Overview
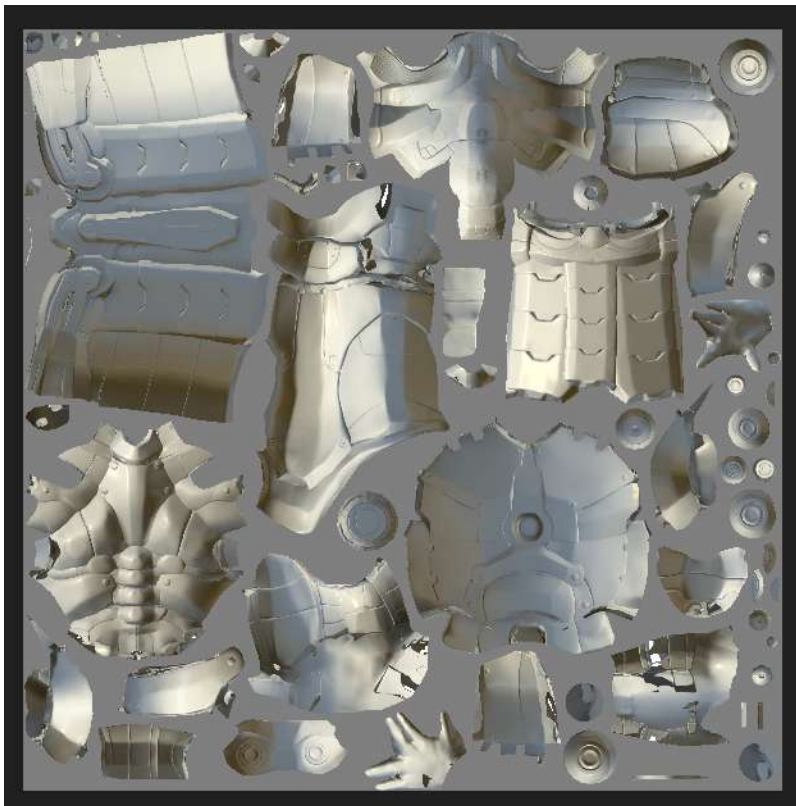
The 2D View in Substance Painter allow to paint directly on the UVs of your mesh. You can still paint seamlessly in this view (depending on your brush settings).
The 2D View is also able to display a shaded/lighted version of your mesh which is convenient to see the relief of your painting.

> Substance Painter doesn't allow to Paint on UV islands outside of the 0-1 range.

3D View

Overview

- **Current Shader** : Current shader name used by the mesh in the viewport.
- **3D Mesh** : 3D mesh on which you can paint on.
- **Background** : Display the environment map used by the viewport to light your 3D Mesh.
- **Axis** : Indicate the current direction of the world based on the camera rotation.

It is possible to quickly cycle through the channels of the current texture set by pressing the "C" shortcut.
This will switch the viewport into the "**solo**" mode, where the channel is displayed without any lighting information. It is possible to go back in the "**Material**" mode by pressing "M".

Viewer settings

The viewer settings allow to control some parameters related the 3D view.
This is also where you can change the shader used by a Substance Painter project.
See the viewer settings page for more details.

Controls

Action	Windows	Mac OSX
Recenter Camera	F	F
Rotate Camera	Ctrl + Left click	Cmd + Left click
Snap Camera	Ctrl + Left Click + Shift	Cmd + Left Click + Shift
Translate Camera	Ctrl + Middle click	Cmd + Middle click
Zoom	Ctrl + Right Click	Cmd + Right Click

You can modify those controls in the Preferences window.

Texture Set

Substance Painter will automatically create a new Texture Set each time it finds a material ID on an imported mesh (unless a project use the UDIM workflow).
Each Material ID is expected to have unique UVs (or logical overlapping for mirrored geometry).

For more details about the **Texture Set** properties and manipulations see :

- TextureSet List
- TextureSet Settings

TextureSet List
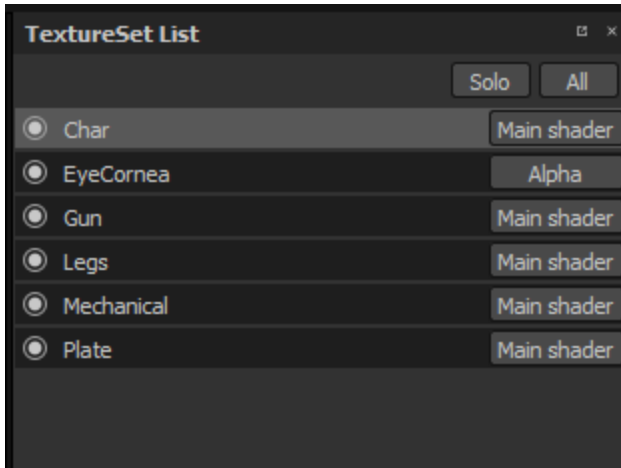
The "Texture Sets List" panel shows all the material IDs from the current mesh of the project.
The display of a texture set can be toggled by clicking on the dot at the left of its name, it will then hide the part of the mesh using this ID from the 3D View.

- Use the **Solo** button to hide all texture set expect the one currently selected
- Use the **All** button to display all the texture set, which is useful in case multiple set have been hidden

The button at the right of each texture set name can be used to manage the shader assignment. By default each texture set share the same shader. However it can be convenient at certain time to have a different shader only for a specific part of the mesh. This can be done by clicking on the button and choosing "**New shader instance**". From there, in the Viewer settings it is possible to change the shader and its parameters.
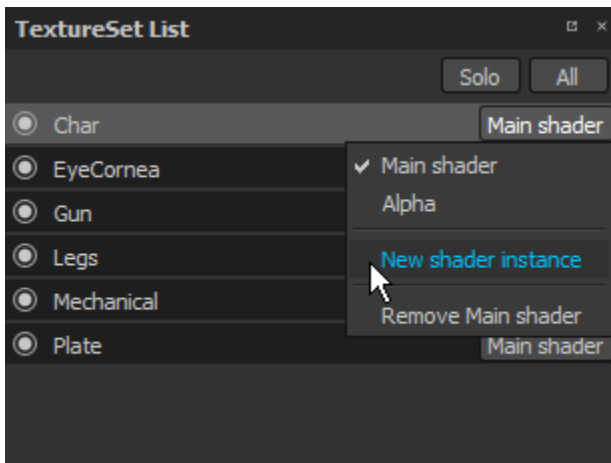
> By default, only the Texture Set which is being selected is displayed when **painting**. It is possible to change this behavior in the Preferences by unchecking "**Only display the material selected when painting**".
> Note that hiding other Texture Sets while painting **improve performances**.

> It is not possible to paint seamlessly on two or more texture sets. Only one texture set can be edited at a time.

TextureSet Settings

The **Texture Set Settings** window is where you can set parameters for the currently selected texture set.
This is also where you can access the undo stack related to this texture set.
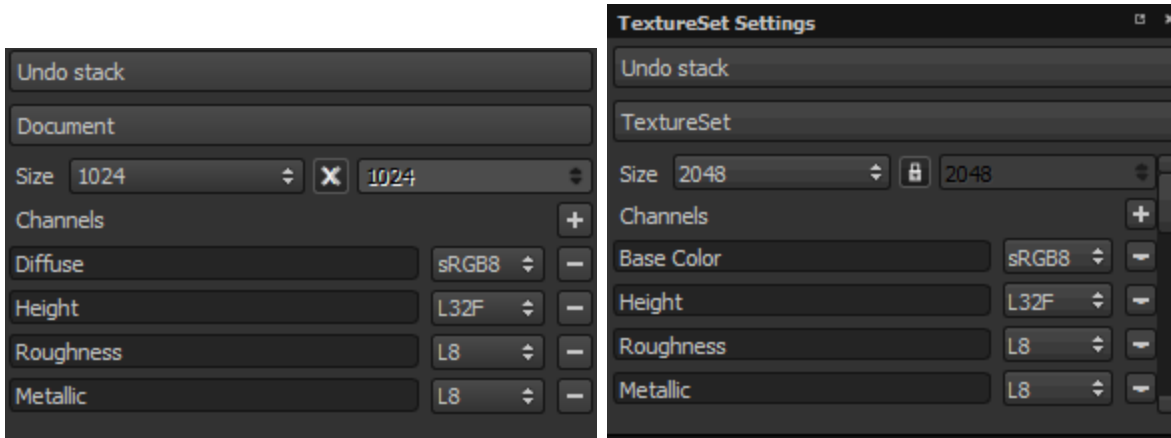
- **Undo/Texture Set** : The Undo stack and the Texture Set settings can displayed by clicking on their dedicated button.
- **Size** : Changes the resolution of the current texture set. Uncheck the lock button to set non-square sizes.

- **Channels** : Use the [+] button add new channel to the current texture set (such as *opacity*, *ambient occlusion* and so on).

- **Channels** : Use the [-] button to remove a channel.
- **Channels** : Use the dropdown to specify which format you wish to use for storing the data of the channel. Default values are usually enough.

"**UserX**" channels are special channels that can be used in custom shader or for other purpose. You can rename them as you want.

The data used for storing the information of a channel (for example sRGB8 or L32F) have no effect on the way Substance Painter will read them. The Roughness channel will still be considered as **Linear**, and the BaseColor will still be considered as **sRGB** (gamma corrected).

List of available data types :

- **sRGB8** (RGB colors, gamma corrected values, stored on 8bits)
- **L8** (Grayscale values, stored on 8bits)
- **RGB8** (RGB colors, stored on 8bits)
- **L16** (Grayscale values, stored on 16bits)
- **RGB16** (RGB colors, stored on 16bits)
- **L16F** (Grayscale values - positive and negatives, stored on 16bits floating)
- **L32F** (Grayscale values - positive and negatives, stored on 32bits floating)
- **RGB32F** (RGB colors - positive and negatives, stored on 32bits floating)

Additional Maps

Below the channels of the texture set are visible the Additional maps Those slots are for special textures used by multiple dynamic filters in Substance Painter. Example :the Curvature, the Normal or the Ambient Occlusion map.
You can either import those map in your project or bake via the dedicated tools inside Substance Painter. See the dedicated page for more information about the bakers.
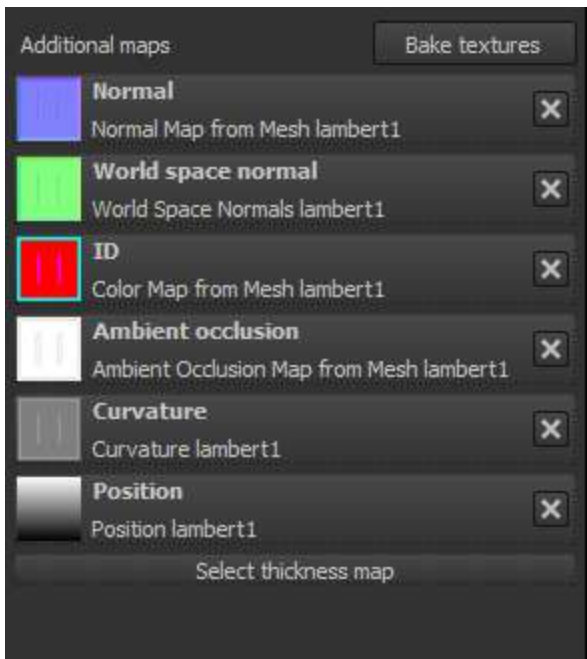
Layer stack
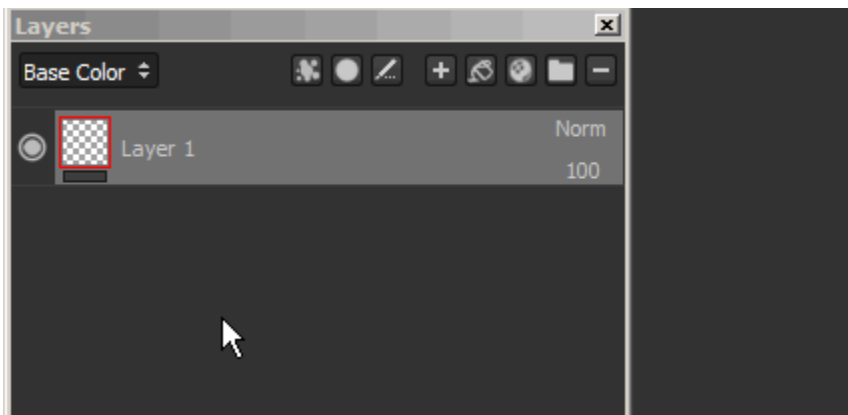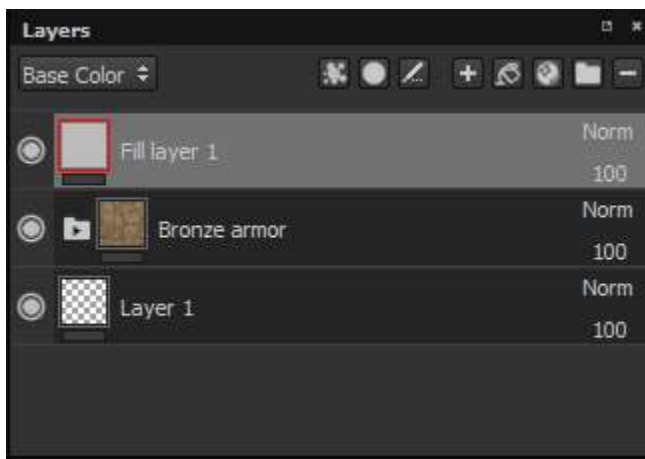
The **Layer Stack** lets you manipulate the layers of a Texture Set. You can hide and unhide layers, put them into folders and change their opacity and blending mode.

The layer stack display layers with a specific hierarchy : the layer at the bottom will be drawn first on the mesh, the layer on top will follow. Therefore the layer at the top most of the stack in the last item, while the layer at the far bottom is the first one. Same principle apply to folders, however the content of the folder take priority. This means the content of a folder will be processed before the layers that are at the same level.

Common characteristics :

- Each layer is **multi-channels**.
- The paint tool will paint **on all of their respective channels** depending of the material settings (which channel you are currently viewing in the Layer Stack has no impact).
- Each Layer has a **blending mode** and an **opacity** per channel (you can switch between channels through the top left dropdown menu).

Types of layers :

- **Layer** : This type of layer can be paint on with brush and particles
- **Fill layer** : This layer cannot be paint on, instead you can load a material in its content to fill the channels. (You can also manipulate the transformation to repeat the material for example.)
- **Folder** : This type of layer as for only purpose to contains other layers

On each layer you can **add a mask** which allow to apply the content only to a specific parts of the channels of the current texture set.
You can either paint on the mask manually (in grayscale with a brush) or use filters and substances for more dynamic/procedural results.

For more information, see the other pages :

- Creating layers
- Managing layers
- Masking and effects
- Blending modes
- Fill Layers
- Layer Instancing

Creating layers

Click on the "+" button to create a new layer :
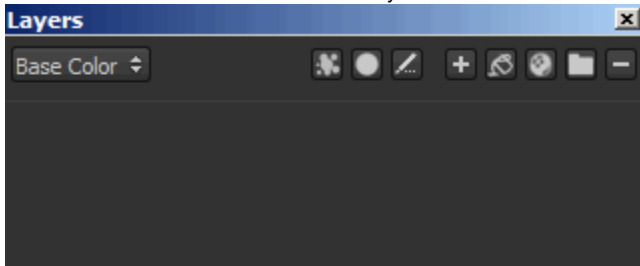
Click on the "bucket" button to create a fill layer :
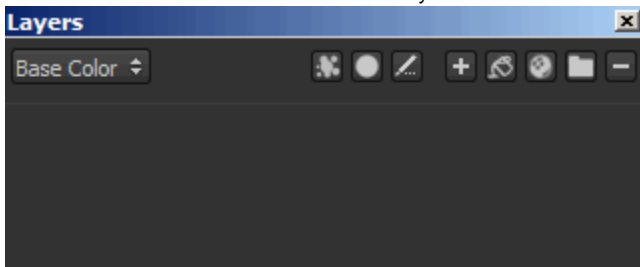
Click on the "sphere" button to open a mini-shelf that gives access to the smart materials :
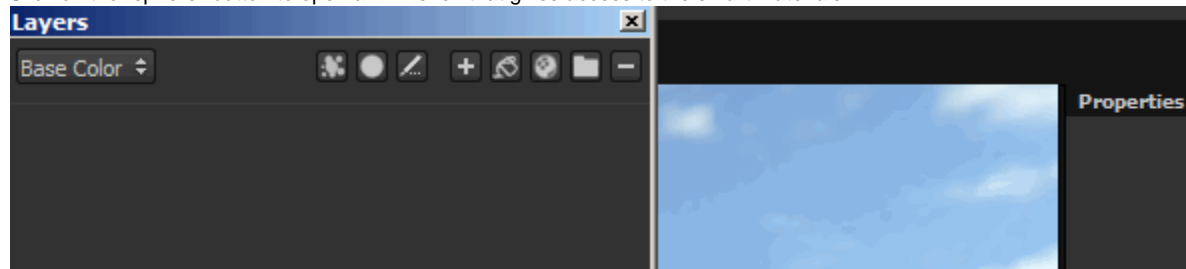
Click on the "folder" button create a new folder :
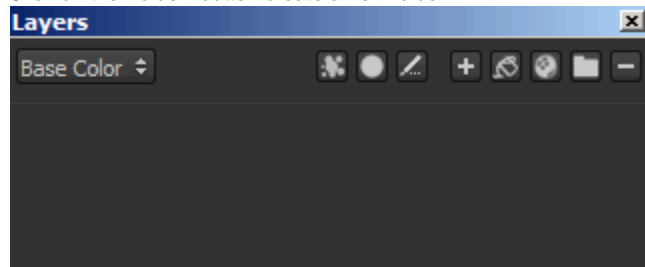
You can also create new layers by duplicating them (by using **right-click > duplicate** or by using the shortcut CTRL/COMMAND + D) :
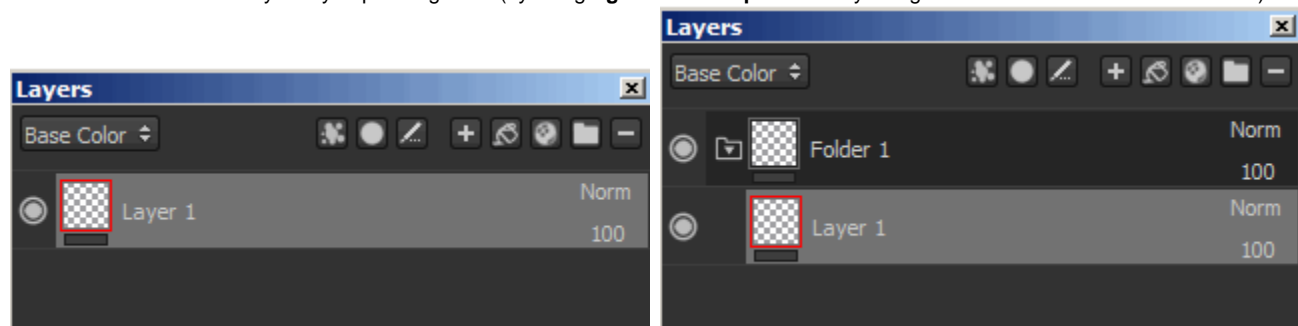
You can delete any layers by using the "-" button or by using the shortcut "Delete" :
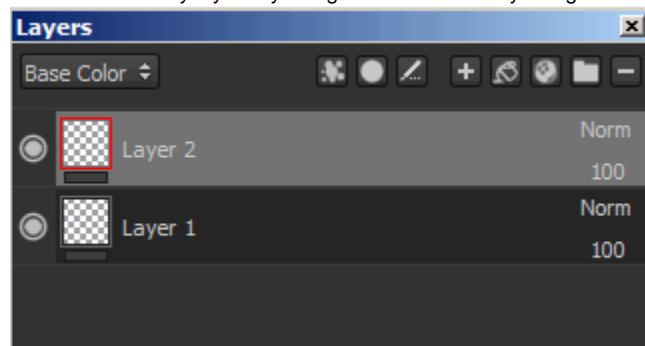
Managing layers

You can move layers by drag and dropping them. A little bar will be visible when doing so that will indicate where the layer will be placed.
If instead of a line you get a rectangle that goes around a layer/folder, this means the layer will be placed below this item. In the case of a folder the layer will be placed at the bottom of its content.

You can also drag and drop multiple layers and folders at once by doing a multiple selection first. To do so press either CTRL/COMMAND or SHIFT and click on the layers that you want to select them.

Example :
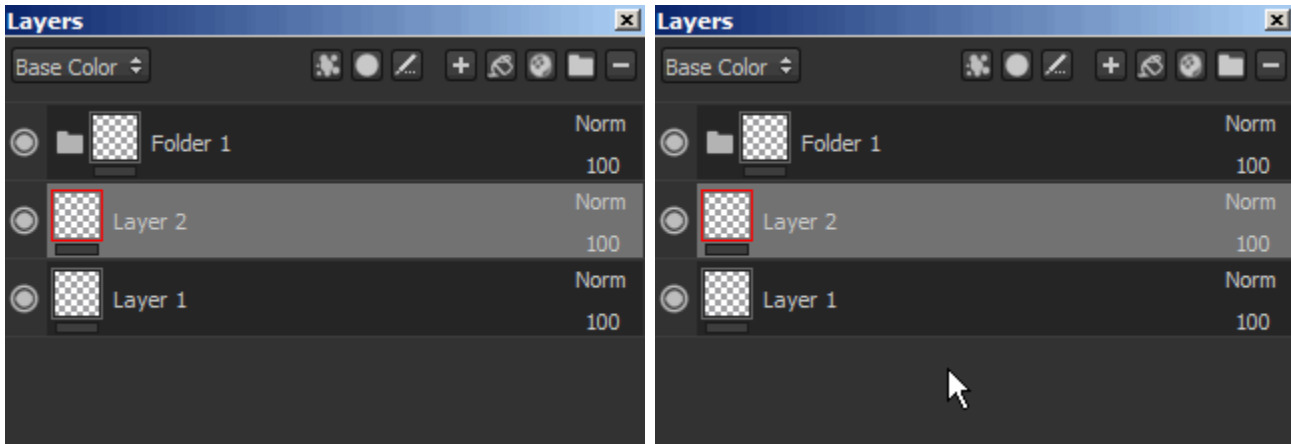
You can also create folders with pre-selected content (by pressing CTRL/COMMAND + G) :
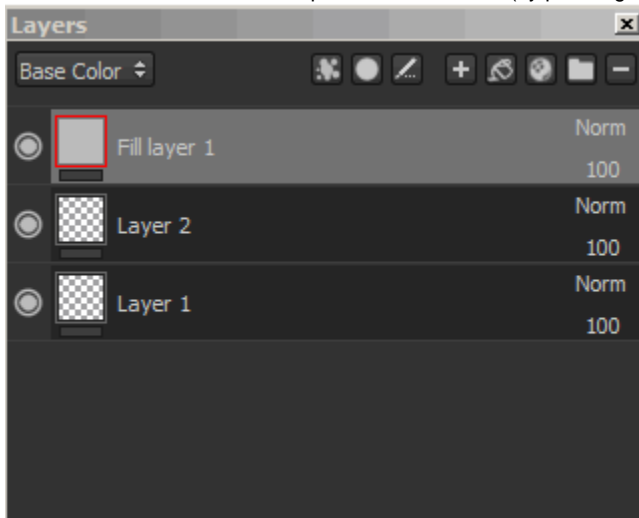
Masking and effects

Masking

Layers can be masked in order to display/apply their content only on specific parts of the texture. The mask works as an intensity parameter over the content of the layer. A mask on a layer is always in grayscale, no matter what content you use to paint over it (therefore any color will be converted to a grayscale value before being painted).

You can add a mask by using the right click menu or by using the dedicated button :
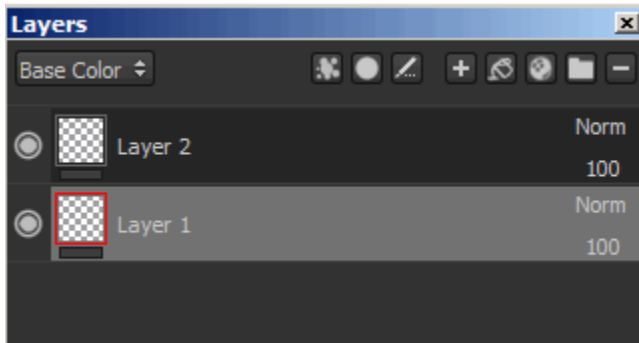
Possible operations on masks :

- You can visualize the mask itself doing **ALT + Left mouse click** on its thumbnail. It will switch the viewport to an isolated view of the mask from this layer. This operation is also available via the viewer settings.
- You can disable temporarily a mask doing **SHIFT + Left mouse click** on its thumbnail. Redo the same operation to enable it again. This operation is also available via the right-click menu ("toggle mask").
- You can copy the content of a mask to an other mask by doing **Right click > Copy mask content** over the thumbnail and then doing **Right-click > Paste into mask** on the thumbnail of the second mask.
- You can invert the background of the mask by doing **Right-click > Invert mask background**. This is useful if you want to avoid destroying the effects attached to a mask.

Adding again a mask or removing it will destroy the mask and all the effects attached to it.

It is possible to immediately create a mask when creating a fill layer (via drag and drop) if the **CTRL** key is pressed :
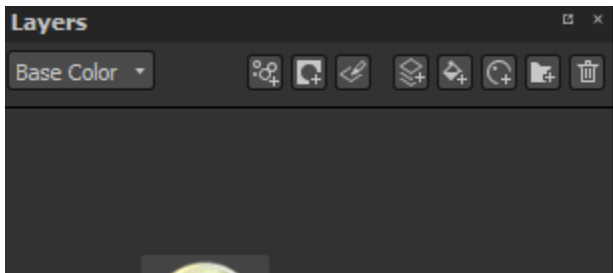
Effects

Effects are special operation that can be edited at any time. The effects are can be placed either on a mask of on the content of a layers. However so effects are more appropriate for on for the other. For example the "generators" are appropriate for the masks.

The line under each thumbnail on a layer indicate if effects exist. Grey equals no effects, red equals at least one effect. There is an effect stack is per mask and per content.
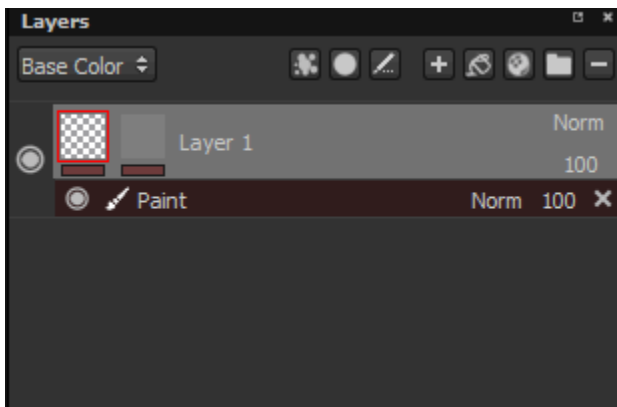
For more information, see the dedicated page.

Smart Masks

The smart masks are a way to save a mask and its effect to easily re-use them on other layers or other projects. To create a smart mask, simply right click over a mask and choose "**Create smart mask**".
When drag and dropping a smart mask onto a layer, a black mask will be created if it doesn't already exist, otherwise the effects list will be merged with the existing one. It is possible to overwrite completely the effect list by keeping "**CTRL**" pressed when dropping the smart mask.
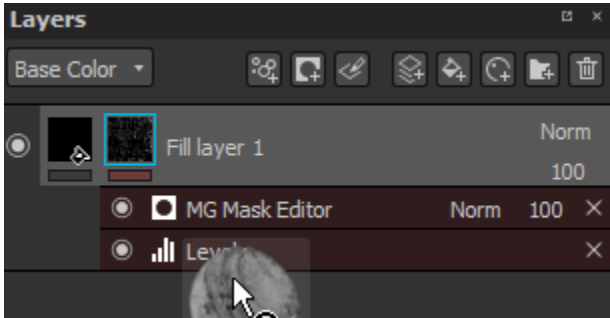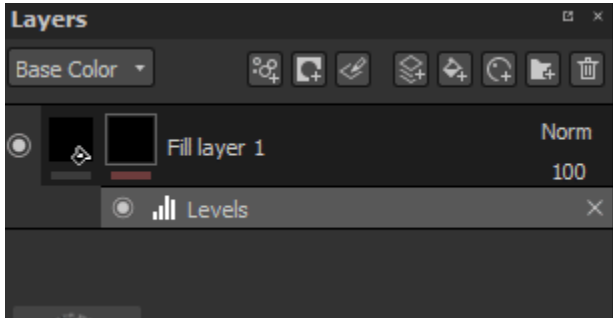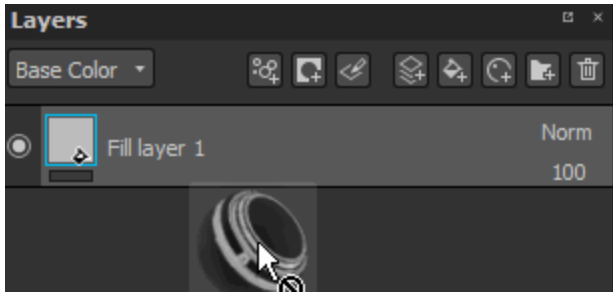
Blending modes

Layers and effects in Substance Painter have access to many blending modes. A blending mode allow to mix the result of a layer with the other layers at the bottom of it.
Substance Painter perform all its blending modes in **Linear space**. Note that all the blending modes are not suited for all use case. For example the Normal map blending mode are only useful for the normal channel in a texture set.

You can change the blending mode of each channel of a layer. To switch between the channels use the top-left dropdown available in the layer stack window.
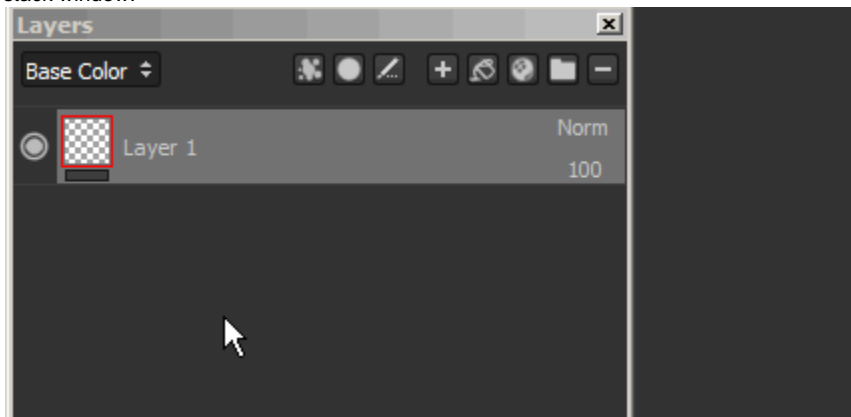
List of blending modes

The following blending are demonstrated with two images (left image being the top layer, right image the bottom layer) :
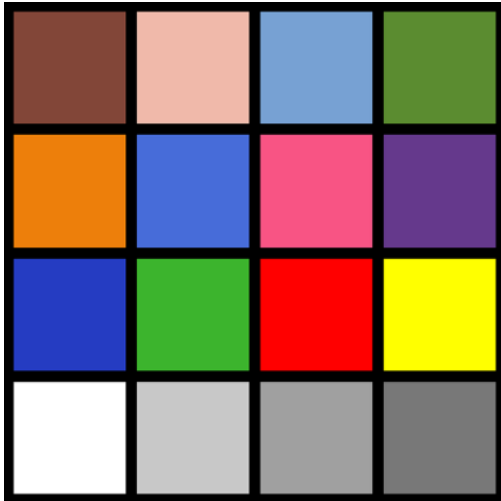
Normal

The normal blending mode the use the alpha from the layer above to composite it (in copy mode) to the layer below.
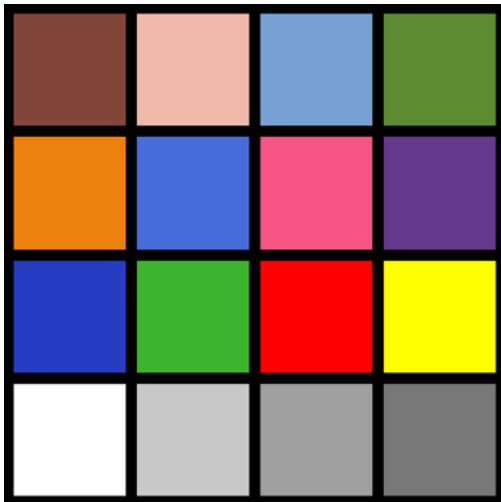
Passthrough

The passthrough blending mode read the layers below in order to apply its blending. This is mostly useful for filters or for using other blending mode inside folders.

Disable

The disable blending mode discard the blending of the layer, displaying only the previous layers.

Replace

Replace simply replace the content before. This is useful for example if you don't want to blend your height information with the layers below.
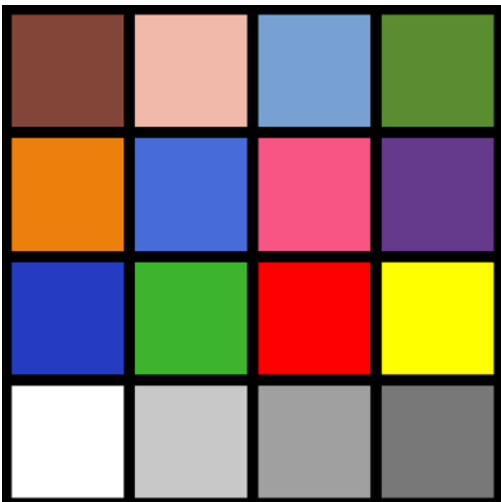
Multiply

Divide

Darken (Minimum)

Lighten (Maximum)
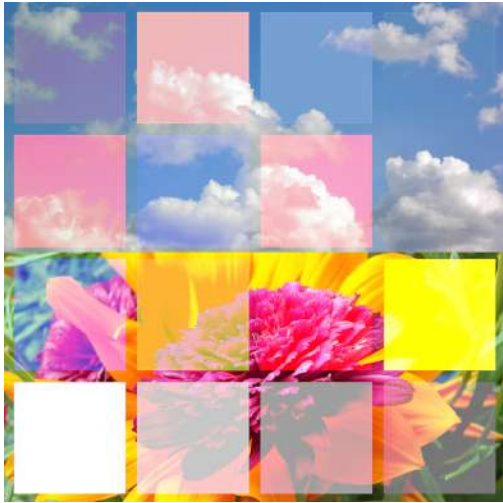
Linear dodge (Add)
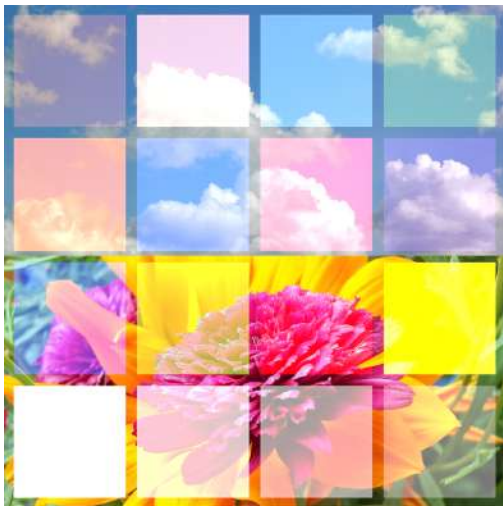
Difference

Exclusion

Overlay

Screen
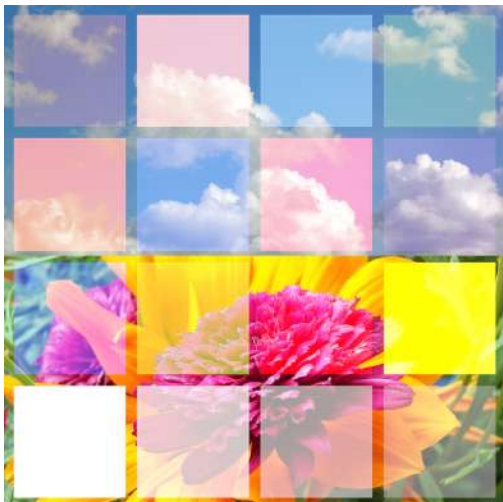
Linear burn
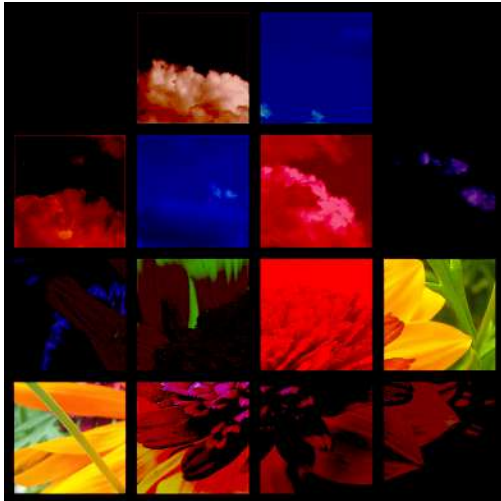
Color burn
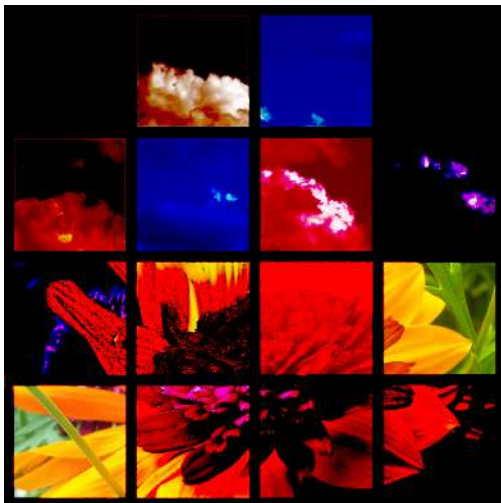
Color dodge
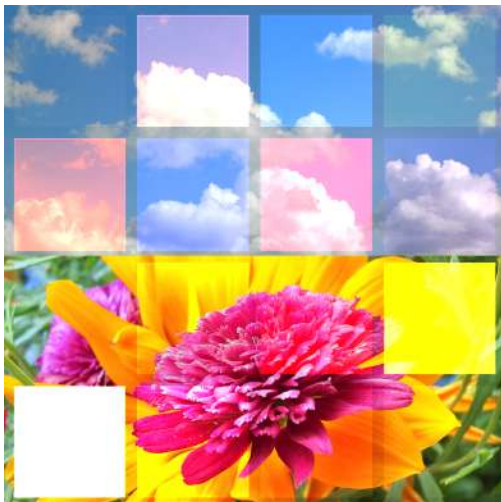
Soft light
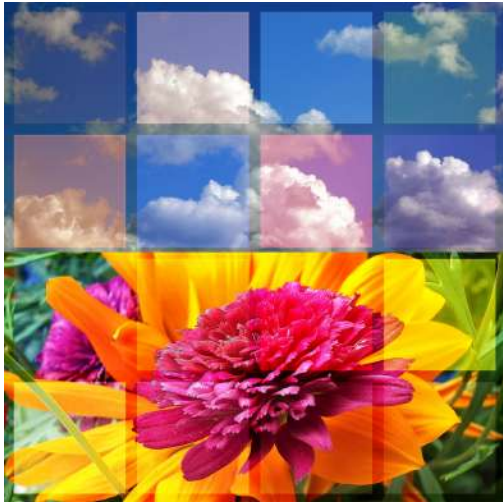
Hard light

Vivid light
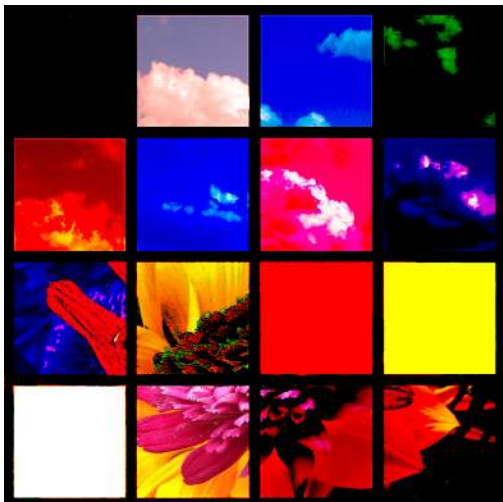
Linear light
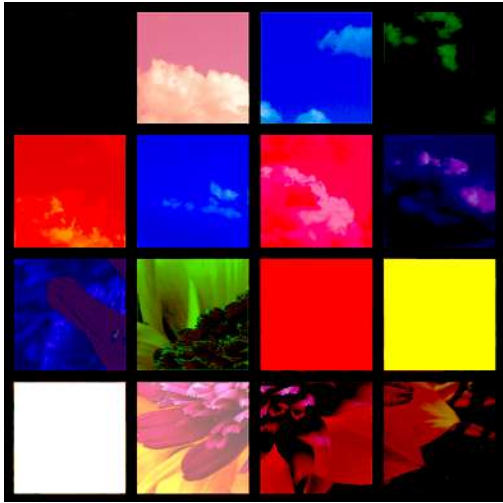
Pin light

Tint

Saturation

Color

Value
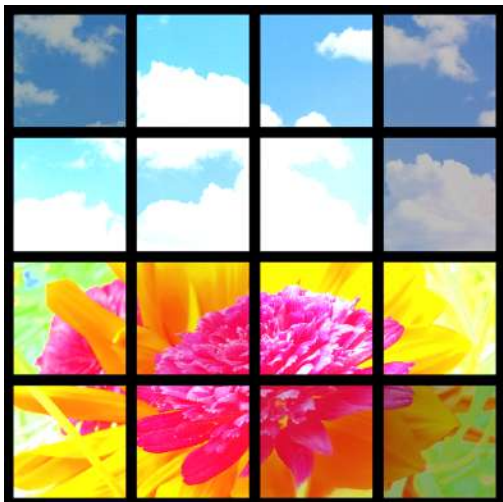
Normal blending modes

For more information regarding the normal map blending mode, see the dedicated page regarding this channel : Normal Map Painting

Fill Layers

Fill layers allow you to fill an entire layer with a texture or a material. It is usually used along with a mask to apply specific materials or maps to parts of mesh.
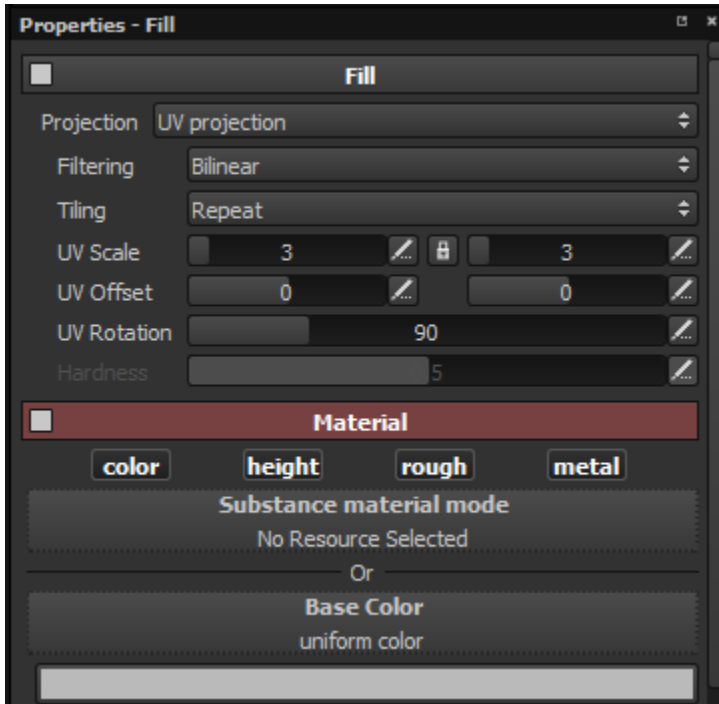
Projection

- **UV Projection** : Regular UV space projection, apply the content in 2D space.
- **Triplanar Projection** : Projects the content on the 3 axes and blend smoothly between each, creating the illusion of a 3D texture, with no visible seam. Use the hardness parameter to control the blending.

Filtering

- **Bilinear | HQ** : (default) Advanced bilinear filtering that try to improve the quality of the texture when the tiling values are high
- **Bilinear | Sharp** : Simple bilinear filtering that smooths the texture slightly but try to preserve.
- **Nearest** : No filtering, useful if the Bilinear filtering gives a blurry result and breaks fine details.

Tiling and transformations

Transformations allow you to scale, offset and rotate the content as well as switch the Tiling to Repeat or None, which will clamp the texture and only display the original tile.

Layer Instancing

Substance Painter supports **layer instancing**, which allows to **synchronize** layer **parameters** across multiple **layers** and **Texture Sets** while still being able to generate a mesh dependent result.
When a layer instance is created, the original layer (or source layer) is used to replicate parameters across all the existing instances. **Only the source layer can be modified**.

Any paint actions (brush strokes, polygon fill, etc.) will only work on the Texture Set where the source layer is located. Other Texture Sets that have an instance of this layer will simply discard the paint actions.

Creating a layer instance

To create a layer instance :

1. Select any existing layer
2. Copy the layer (CTRL+V)

3. Paste is as an instance (use CTRL+SHIFT+V or right-click to open the context menu and choose "Paste as instance")
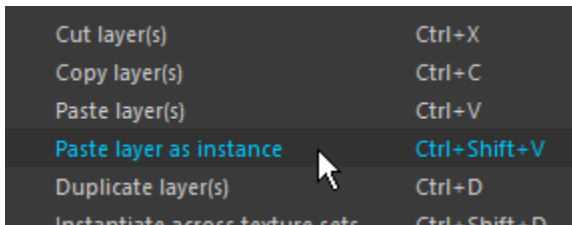
Instance can be created from **any layer**, this includes **folders**. Instancing a folder can be an easy way to replicate multiple layers across various Texture Sets. Adding layers inside an instance folder will also replicate them into existing instances.

Once an instance has been created, the source layer will display **a new button** with two plain cards, while the instanced layer will display two empty cards :
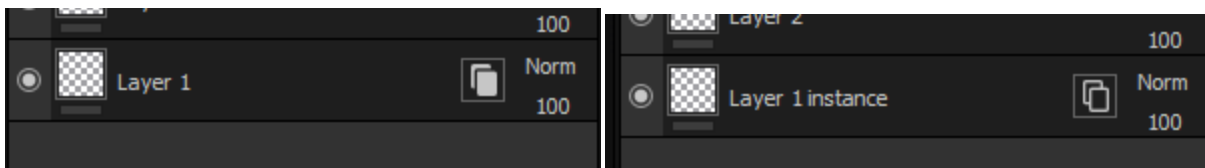
This new button can be used to navigate between a source layer and its instances more easily, without having to manually switch between Texture Sets (see below).

Creating an instance across Texture Sets

It is possible to create a layer instance on multiple Texture Sets in one action, avoiding to copy/paste it manually. This is especially useful for UDIM project configuration.

To create an instance across multiple Texture Sets :

1. Select any existing layer
2. Right-click on the layer to open the context menu
3. Choose "Instantiate across texture sets"
4. In the new window, check which Texture Sets needs to receive an instance.
5. Click OK to validate and create the instances.
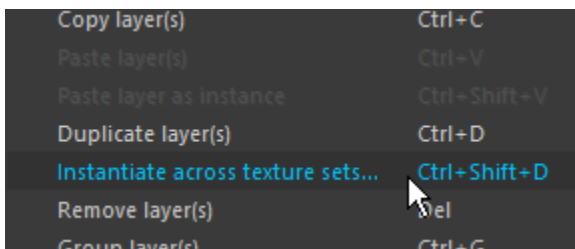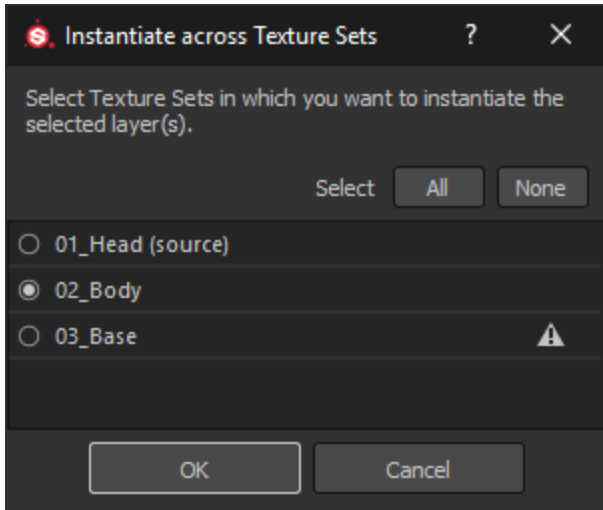
> The exclamation point next to a Texture Set name indicates a channel **mismatch**. It means that if an instance is created in this Texture Sets, it will not render correctly because a channel is missing.

Switching between an instance and its source

Since an instance can **only** be updated by **editing the source** (because of technical reasons), it is mandatory to select the source layer to edit its properties.
This can be done by clicking on the **instance properties button** on the layer in the layer stack.
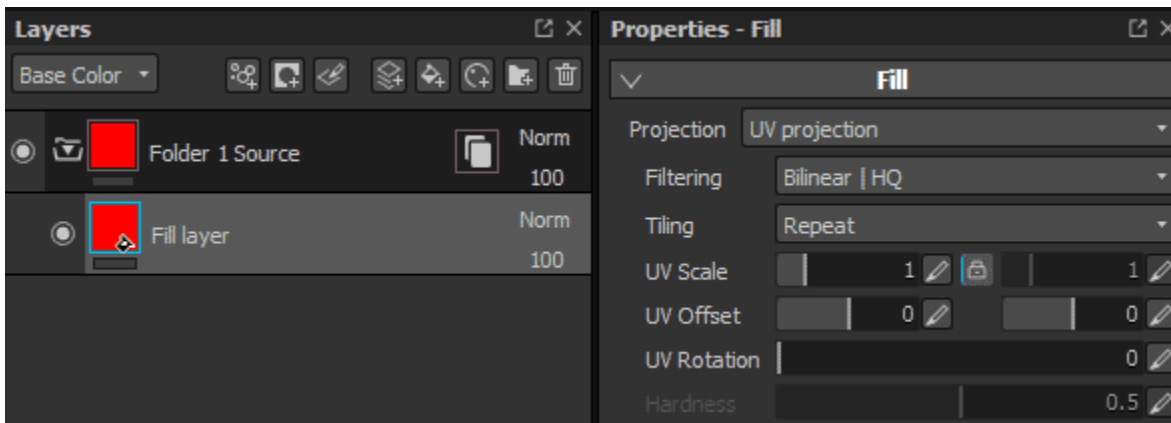
When clicking on an instance properties button, it will switch the **properties window** from the current tool/layer to **a list** displaying a source layer and its instances.
Clicking on **any element** of the list to automatically **jump to this layer**. This will automatically **change** the current **Texture sets selected** to the right one as well.

Using the **instance tree** list is the best way to **quickly** go from an instance to its source while seeing the **dependencies** at the same time.

Instance cycles (and how to solve them)

Cycles are instances that are used into the source layer itself either directly or indirectly. Cycles **cannot be computed** by the Substance Painter engine and therefor require to be **disabled** until fixed or removed.

Example :
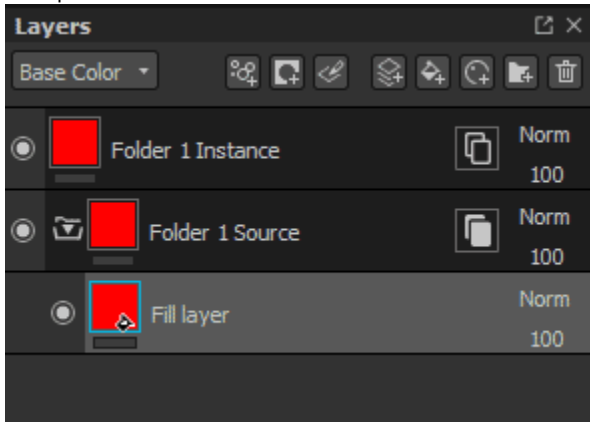
In this example, the instance of the source layer is moved inside it (because it is a folder). The instance becomes broken because in order to generate its parameters we need to query the parameters from the source, which depends of the parameters from the instance. This create a cycle that cannot be solved automatically. The instance becomes disabled.

The only way to fix a cycle is to either **move** the instance outside the folder or to **delete** it.

> Layer instances can be used in source layers as long as the the instance itself refer to a different source layer.

Shelf
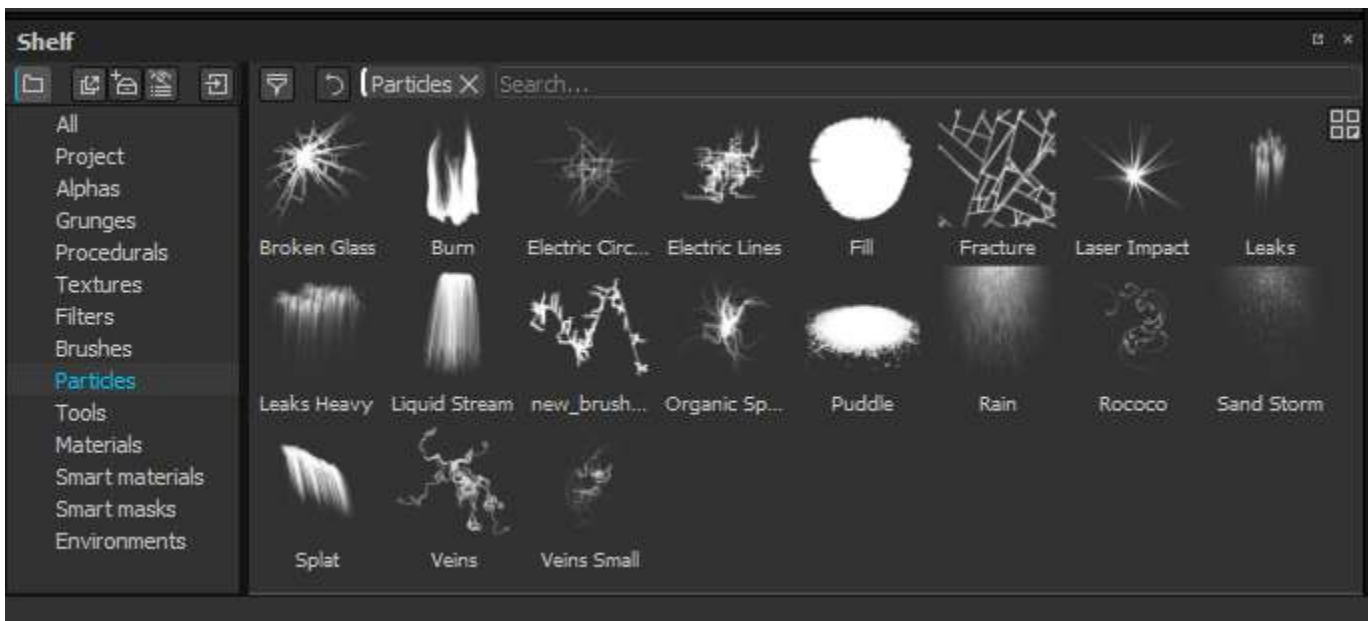
The Shelf is where it is possible to manage all the assets and resources used in a project, the current session or which are available on the disk. The shelf can list various type of files. Going from bitmaps to substances or even custom brush presets.

There are two type of windows with the shelf : the **main shelf** and the **sub-shelf**.

- **The main shelf** allow to manage the shelf presets and navigate the various resources
- **The sub-shelf** are custom windows that can be created at any time in interface. The are created from shelf presets.

For further details, see the dedicated pages :

- Navigating in the Shelf
- Filtering shelf content
- Creating shelf preset

- Sub-shelf windows
- Adding content to the shelf

Navigating in the Shelf

Main interface
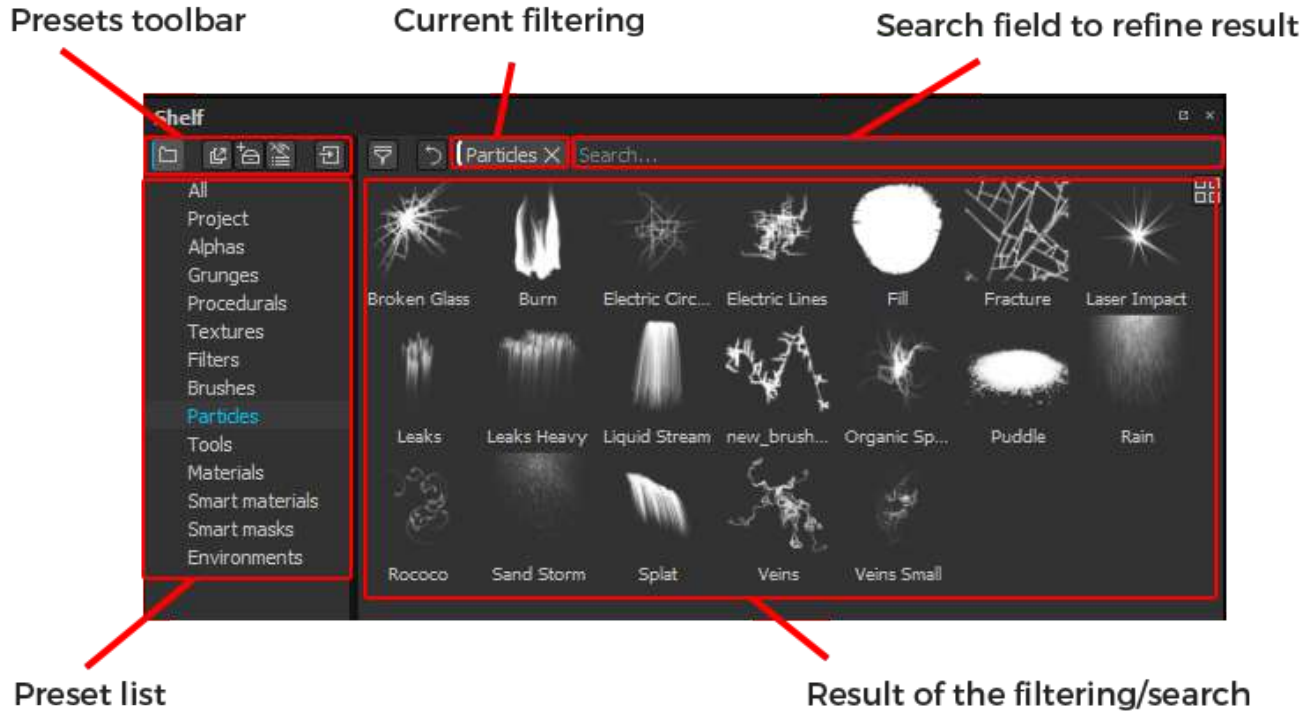
Preset toolbar

The **preset toolbar** contains a list of button of various purpose :

1. Expand/Collapse the list of presets
2. Extract a shelf preset or the current search into a new window
3. Save the current filtering into a new shelf preset
4. Hide the default presets
5. Import new ressources (see the documentation page)

Preset list

The preset contains the list of all the existing presets.
The default preset cannot be deleted, but can be hidden via the dedicated button. Newly created presets can be renamed or delete at any times.

> Once a preset has been extracted into a dedicated window, updating the preset won't update the window. They are not dynamically linked.

Filtering and search field

1. Open the panel to configure the current filtering
2. Reset the current search query to its default (if it was modified)
3. Current search query (over with the mouse to see the tooltip describing the full query)
4. Search field for typing additional keyword and refining the current filtering

For more details about the filtering system, see the dedicated page : Filtering shelf content

Viewing information of an asset

It is possible to right-click on an asset in the shelf to get more information :
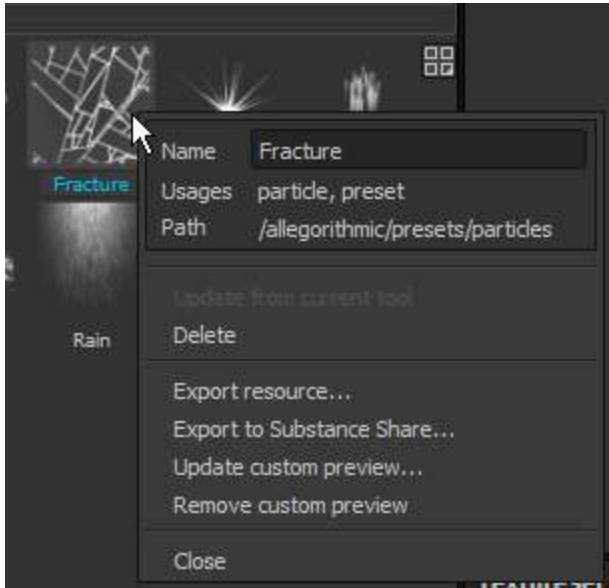
The context menu will display :

- **Name** : The name of the asset (that you can rename if it is a preset).
- **Usage** : The type of use that the ressource refer to, used to filter it we doing a search.
- **Path** : Location of the asset. It can be either **Project** (for the current project), the **Session** or the name of the **Shelf**. (You can add custom shelf location.)

- **Update from current tool** : will update the preset based on the current parameters available in tool properties window.
- **Delete** : In case of a preset, it removes the asset from the disk. If you do so, an **Undo** button will be available.
- **Export to Substance Share** : Open a windows that allow to export the asset to Substance Share.
- **Set/Update custom preview** : allow to specify a custom thumbnail for this asset.
- **Close** : Close the context menu.

Filtering shelf content

When opening the "filter" panel of the shelf, it is possible to access three type of query :
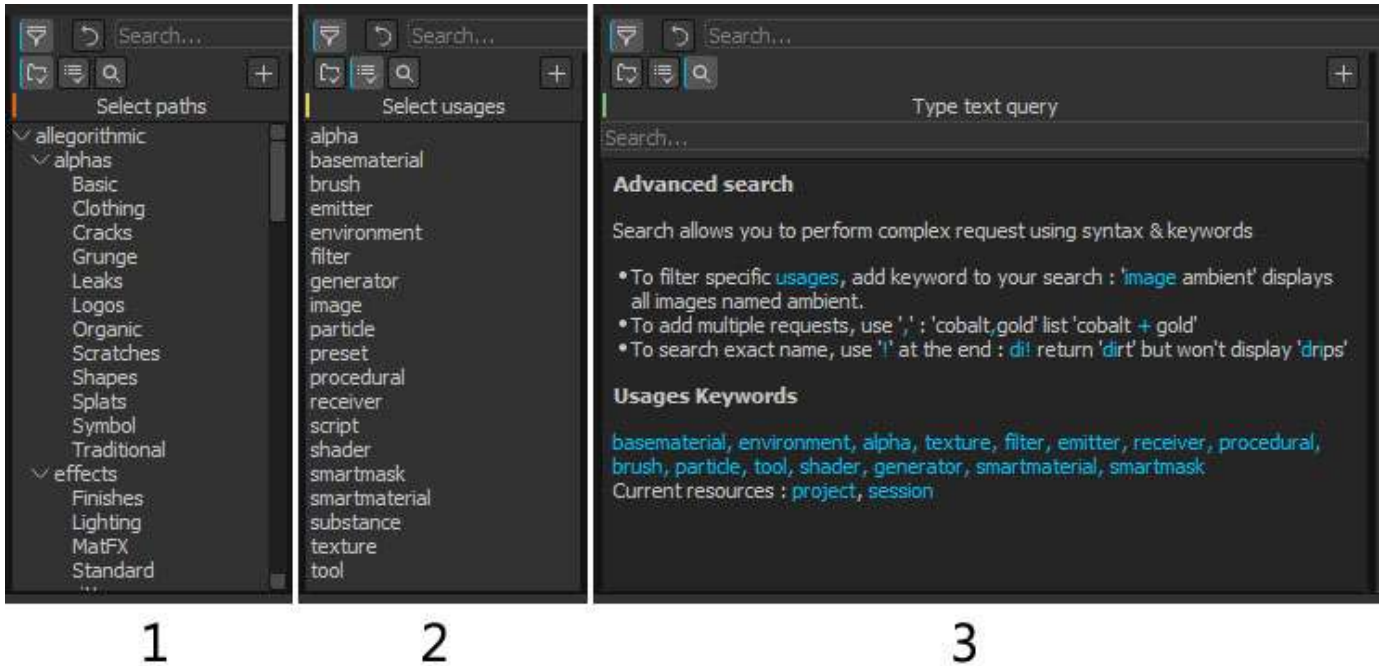
1. **Path** : allow to refine the result of a search by a folder/folder structure.
2. **Usage** : List all the possible usage that are available in the application
3. **Text query** : Allow to add any other type of query freely (like custom keywords)

Multiple selections are allowed when defining a new search query.

Path

The path query allow to refine a query based on a path. The tree-view list all the available shelf (defined in the main preferences).
It is possible to therefore use it for filtering by custom shelf path or for specific sub-folders in the hierachy.

Usage

Usage define what a resource is and how to use it in Substance Painter. Some can be defined by the filetype of the ressource, some other don't.
For example :

- **pbr.glsl** : Shader file, can only be used at one place.
- **effect.sbsar** : Substance file, can be a mask generator, a filter or even a material.

That's why it is important to specify properly the usage of a resource when importing it into the shelf, otherwise it will be impossible for the application to recognize it properly.

Text

The text query support multiple type of filtering, some being more advanced that the regular interface.
They can be enabled by typing the right keywords.

- **Available search types** :
    - "**n:**" : name
    - "**s:**" : shelf (includes "session" and "project")
    - "**p:**" : path
    - "**u:**" : usage

- **Escaping** : it is possible to either use "****" before the character that need to be escaped or use quotes instead, example :
    - **a\ name\ with\ spaces**
    - **"a name with spaces"**

- **Specific attributes (or group)** : to search in specific attributes, prepend a 'or group' with a type specifier. Example :
    - **n:a,b,c,d** : name is a or b or c or d

- **Search behavior** :
    - To filter specific usages, add the specific **keyword** to your search for example : "**images** ambient"

- To add multiple request, use a comma "**,**", for example : "cobalt**,**gold" (if a comma is you used, the search will only show a resource that match both keyword at the same time)
- To search for an exact name, use an exclamation point "!" at the end, example : **di!** (will return **dirt** but not **drips**, this keyword disable the fuzzy matching)
- To exclude a pattern from a search, use an hyphen "**-**", for example : **u:image n:-normal** (will return images that don't contain "normal")

- **Matching functions (pattern suffix) :**
  - **default** : approximate matching (fuzzy)
  - **contains** : !
  - **regex** : #
  - **equal** : =
  - **starts with** : ^
  - **ends with** : &

Creating shelf preset

Shelf presets are a way to quickly filter the ressources present in a Shelf from a specific query.
They are a good way to save a commonly used search or to organize the content of a Shelf into sub-categories.

Shelf preset are saved in a config file that can be edited manually. See : Adding shelf presets manually

Creating a new shelf preset

The following example will show how to create a shelf preset to list the **Generators**.

1 - Selecting an existing query to start with

Click on the shelf preset **All** :
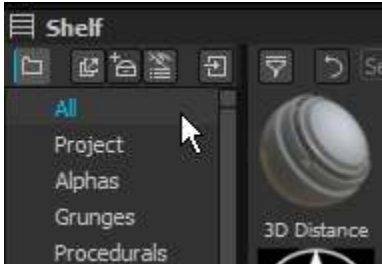
2 - Open the shelf filter

Now open the shelf filter parameters section by clicking on the dedicated button :
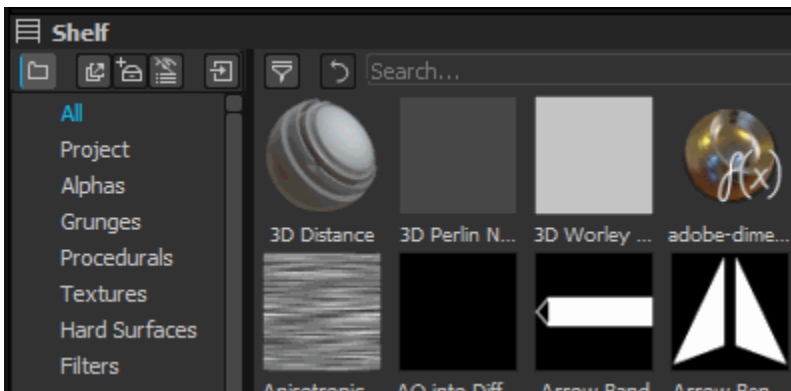
3 - Select the usage "generator"

Switch the filter view to the "**usages**" by clicking on the second button
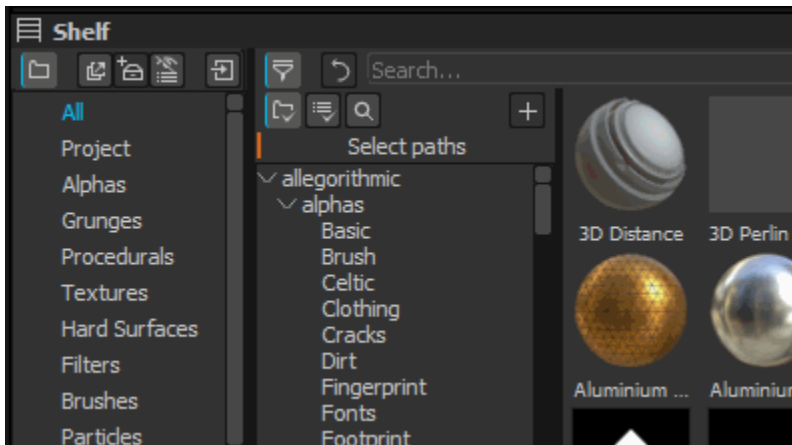
Notice that next to the search field at the top of the shelf window a new filter has been added. Its color is yellow because it is a temporary filter.

4 - Saving a query as a preset

To save the current query click on the save preset button :
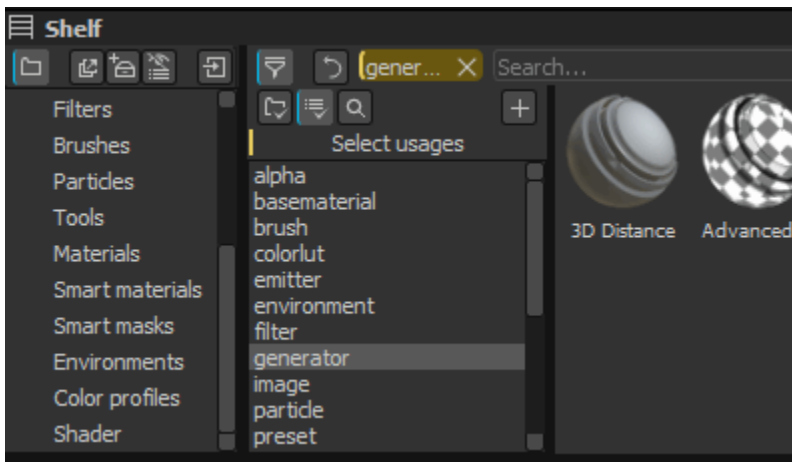
Sub-shelf windows

A sub-shelf is a new window in Substance Painter dedicated to a specific filter.
There is no sub-shelf window by default, only the main shelf window. You can create sub-shelf window from the main shelf from two locations :

- By **right-clicking** on a shelf filter and choosing "**Create sub-shelf**".
- By **selecting** a filter and then using the dedicated **button** at the top of the shelf window.

Creating a sub-shelf will automatically create a new window and **dock it** in the interface.
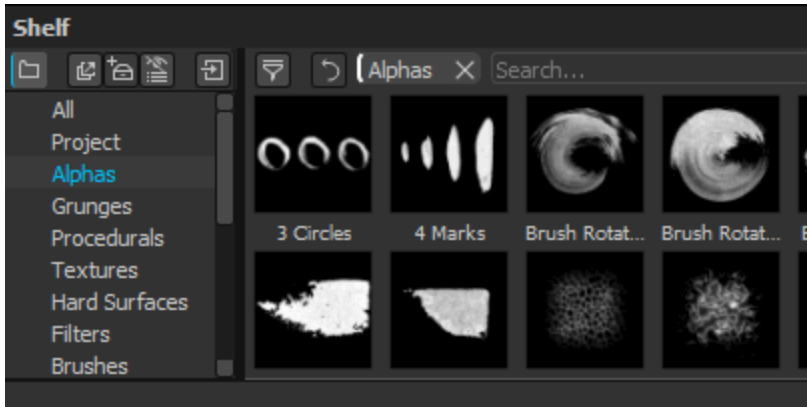
From there, the sub-shelf window can be docked anywhere else or be kept floating on top of the interface.

- A sub-shelf mostly has the same features as the main shelf window. However the preset list is not available, this means it is not possible to edit/remove/create new search filter from it.
- Closing a sub-shelf window will require to re-create it.
- A sub-shelf window is independent from the preset is has been created.
- If a shelf preset is removed, the sub-shelf window will continue to exist until closed.

Adding content to the shelf

There is multiples ways to add content to the shelf :

- Adding content via the import window
- Adding content on the hard drive

Adding content via the import window

Opening the import window

The import window of Substance Painter can be called by three different ways :

- Via the **File > Import resources...** menu entry
- Via **drag and drop** of one or more files/folders into the shelf window
- Via the **dedicated button** in the shelf window (see image below)
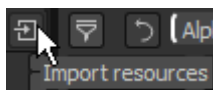
Import button in the shelf :

Configuring the import window
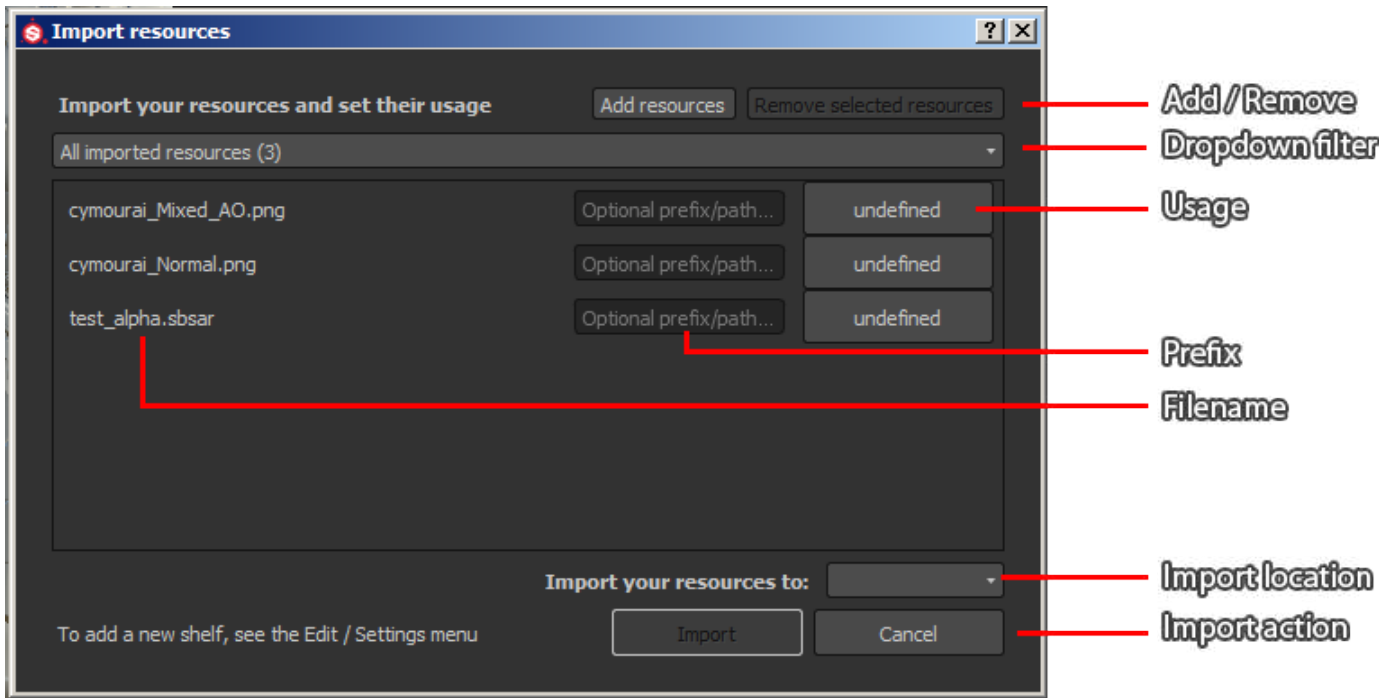
- **Add ressources** : Allow to select additional file to import them.
- **Remove selected ressources** : If a file is selected in the list, this button will remove it.
- **Dropdow filter** : Allow to filter the list of files by usage. This is useful to isolate ressources that are currently undefined.
- **Usage** : see the "usage" section below for more information.
- **Prefix** : The prefix can be a folder path to store a ressource (if imported on the disk) or an additional search tags linked to the file (if imported in the project)
- **Filename** : Name of the current ressource. Sometimes the folder from where the ressource was found can be indicated, this information won't be used during the import process.
- **Import location** : Can be either :
    - **Current session** : Into a temporary session, ressources will be lost after a restart of the application.
    - **Project "project name"** : Into the currently opened project file. Resources are embedded in the **spp** file.
    - **Shelf "shelf name"** : Into the current shelf defined as writable. See this page for more information : Shelfs

You can select multiple items at once in the import window to quickly edit some information :
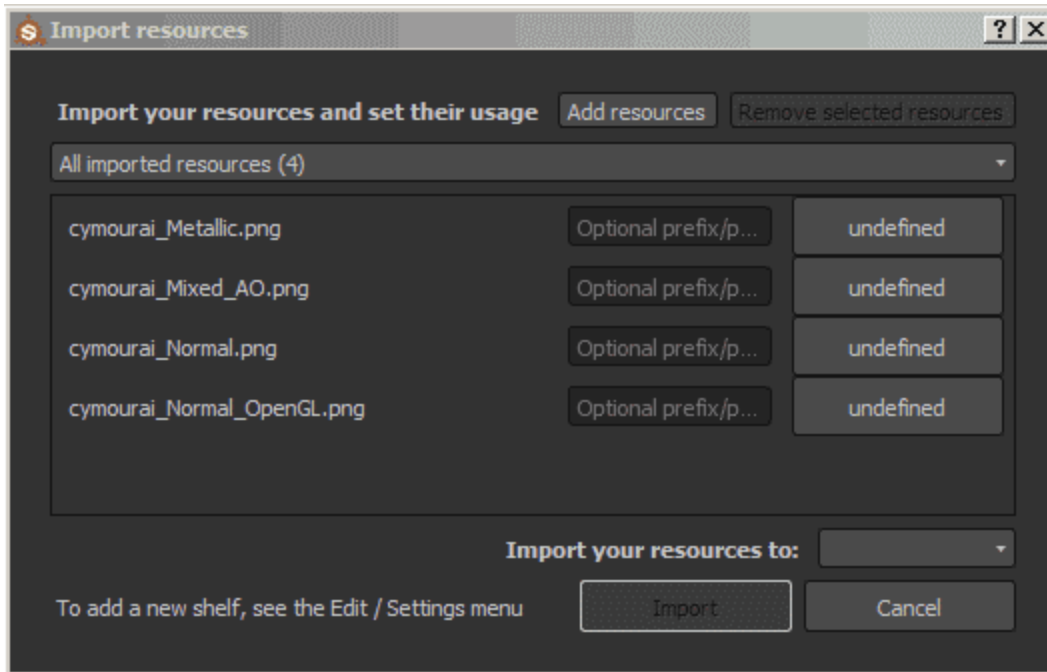
Adding content on the hard drive

It is possible to add content in a shelf by placing new content directly on the hard drive at the right location.
By default with Substance Painter, a shelf folder is provided to be able to put new content. This default shelf is used to save brush, tool or any other kind of presets.

The default user shelf can be found here :

- **Windows** : C:\Users*username*\Documents\Allegorithmic\Substance Painter\shelf\
- **Mac OS** : Macintosh > Users > *username* > Documents > Allegorithmic > Substance Painter > shelf
- **Linux** : /home/*username*/Documents/Allegorithmic/Substance Painter/shelf

The folder can be named differently depending of your software version, for example "**Substance Painter 2**".

The default content **shipped** with Substance Painter is replaced in each new version. Putting personal content here will be **erased after an update**.
This is why it is recommend to use the Documents folder instead, or a custom shelf path. See this page for more information : Shelfs.

Before Substance Painter 2.4.0 : Inside the shelf folder in the "Documents" you will find a folder named "**allegorithmic**", this is the content shipped with the application.
After Substance Painter 2.4.0 : The content shipped with Substance Painter is now located in the "**allegorithmic**" folder, which is located in the installation folder of the application.

There are different kind of files supported by the Shelf of Substance Painter.
A folder is used to determine the usage of a ressource, this is why it is importante to choose the right folder when adding new content :

- **SBSAR** (substance materials) can be used as "**Materials**" (they go into *"shelf \ materials"*)
- **SBSAR** (filters) can be used as the "**Filters**" (they go into *"shelf \ effects"*)
- **SBSAR** (generator) can be used in the "**Generators**", (they go into *"shelf \ effects"*)
- **SPPR** (material presets) can be used in the "**Materials**", (they go into *"shelf \ presets \ materials"*)
- **SPPR** (particle presets) can be used as "**Particles**" brush, (they go into *"shelf \ presets \ particles"*)
- **SPSM** (smart materials) can be used in the "**Smart Materials**", (they go into *"shelf \ smart-materials"*)
- **Textures** (PNG, TGA, JPEG, and so on) can be used as "**Textures**", (they go into *"shelf \ textures"*)

SBS (not SBSAR) files can't be used in Substance Painter directly, you need Substance Designer to export them as SBSAR.

Viewer Settings

The viewer Settings window allows you to configure the rendering in the viewport.
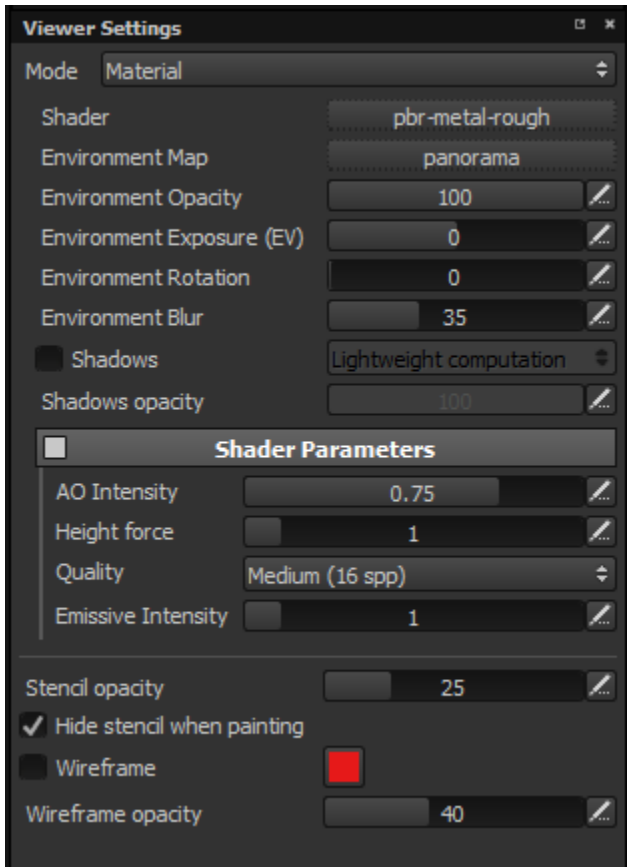
- Mode: Choose between Material (**Shortcut M**), Solo mode (**Shortcut C + C again to cycle through the channels**) and Mesh Normal mode.
- Tool Opacity: Changes the opacity of the tool preview under your cursor when painting
- Stencil Opacity: Changes the opacity of the stencil overlay

Material Mode

Shader: choose which shader to use.

> You can add custom shaders by drag&dropping them in Documents / Substance Painter / Shader.
>
> Please note that you would need to create custom materials. By default the materials provided in Substance Painter are made for PBR metallic/roughness workflow.

Environment map: choose which environment map to use

Environment Opacity: the opacity of the environment

Environment Exposure: the exposure of the environment

Solo Mode

Channel: Chooses the channel displayed in the 3D view

Unlit: Choose to lit or unlit your mesh.

Scale: When visualizing a HDR map, controls the exposure (see Height Map Painting for more details)

+/- colors Height maps can have both negative and positive values, this mode allows you to see both with different colors (see Height Map Painting for more details).

Mesh Normal Mode

This mode simply displays the mesh normal map.

Custom tweaks

Those are the custom parameters of the shaders.

Display Settings
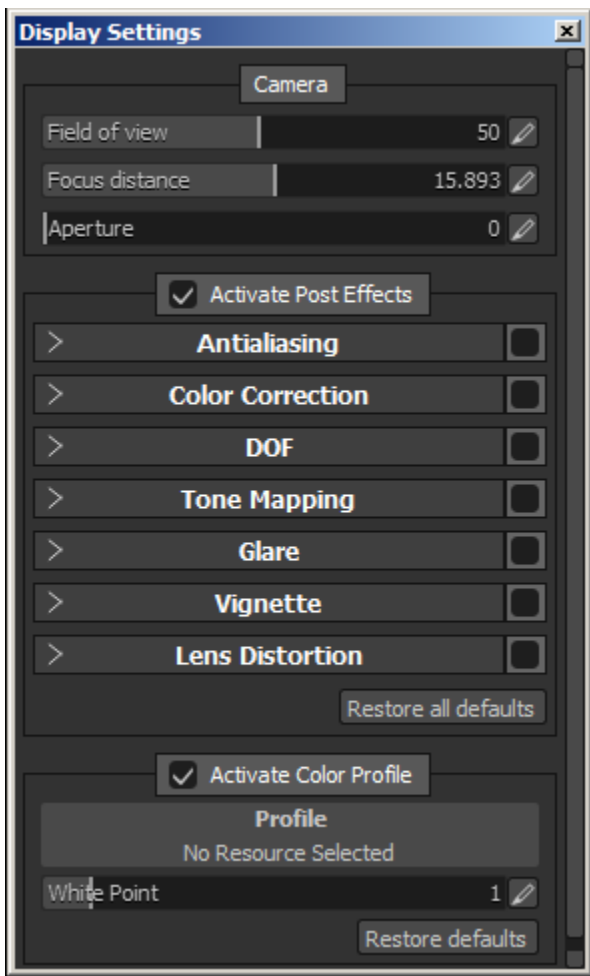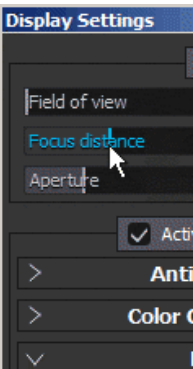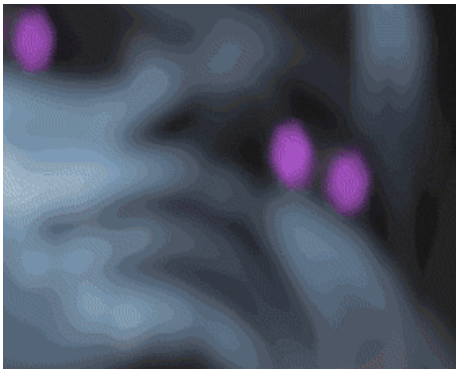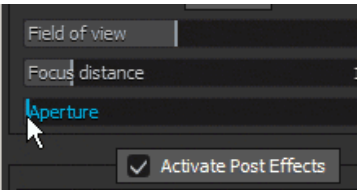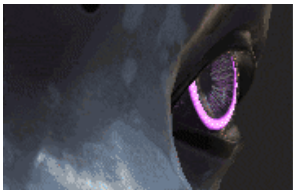
The **Display Settings** window regroups a few **Camera** settings alongside the **Post-Process** Effects. These effects can be used to improve or enhance the look of the viewport.
It is also possible to configure a Color Profile with it. For more details see : Color Profile

Camera

The camera settings allow to tweak the behavior of the 3D viewport camera :

Setting	Description
Field of View	Allows to control the Filed of View of the camera (in degrees)
Focus Distance	Defines the distance at which the focus point is located. This point is used by the Depth of Field effect. The Focus Distance can be set automatically by clicking on a point of the mesh with the shortcut **CTRL + Middle Mouse Button**
Aperture	Defines how wide the Depth of Field will be. If Iray is controlling this parameter, changing it will re-trigger a computation.

Post-Process

The Post-Process effects are powered by the middleware Yebis.
Effects can be enabled individually, but the main post-process system has to be enabled first as follow :
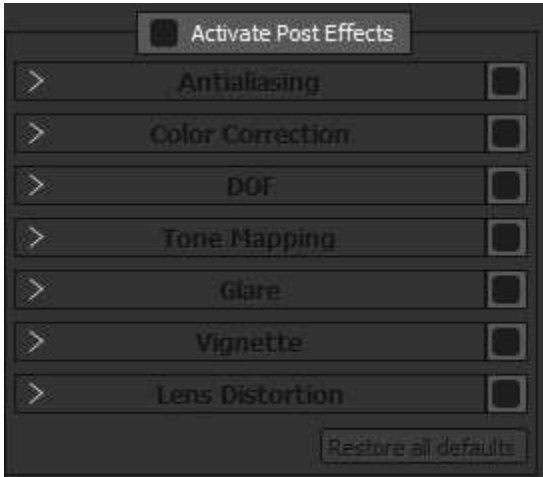
For more details, see the dedicated page of each effect :

- Antialiasing
- Color correction
- Depth of Field (DOF)
- Tone Mapping
- Glare
- Vignette
- Lens Distortion

> These post effects are not applied to the 2D view for convenience. Only the 3D view show the image result with the effects.

Antialiasing
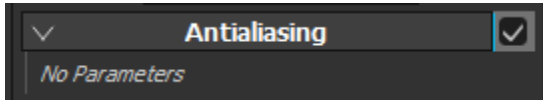
The goal of this effect is to improve the rendering of the edges and avoid a "stairs" look.

The anti-aliasing parameter of Yebis is an **FXAA** post-process.
There are no setting for this effect other than enabling/disabling it.
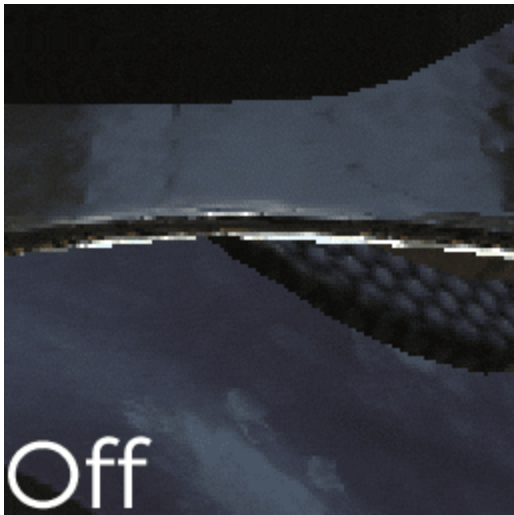
Color correction
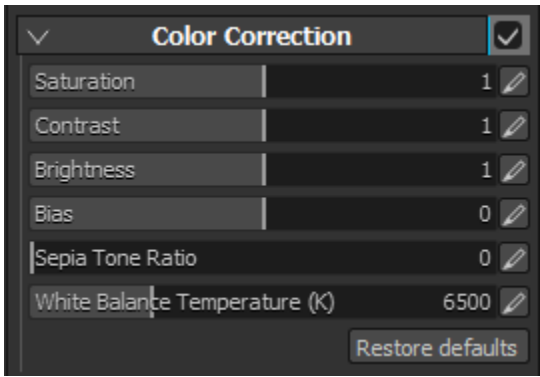
Color correction parameters :
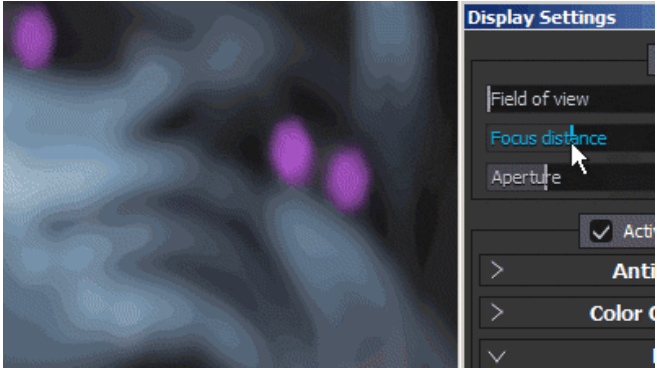
Setting	Description
Saturation	Controls the intensity/saturation of the color in the viewport. Use a saturation at 0 to get a grayscale render.
Contrast	Controls the difference between bright and dark colors.
Brightness	Controls the brightness/luminance of the colors.
Bias	Globally offsets the luminosity of the viewport.
Sepia tone ratio	Advanced parameter to give a sepia effect to the viewport.
White Balance Temperature (K)	Temperature of the colors, in Kelvins. Default is 6500K, corresponding to daylight. See Wikipedia for more information.

Depth of Field (DOF)

The **Depth of Field** (DOF) has no direct parameter. If enabled, it will **override** the DOF from **Iray**.

For controlling the look of the DOF in the viewport, two settings are available via the Camera :

Setting	Description
Focus Distance	Defines the distance at which the focus point is located. This point is used by the Depth of Field effect. The Focus Distance can be set automatically by clicking on a point of the mesh with the shortcut **CTRL + Middle Mouse Button.**
Aperture	Defines how wide the Depth of Field will be.

If Iray is controlling this parameter, changing it will re-trigger a computation.

Tone Mapping
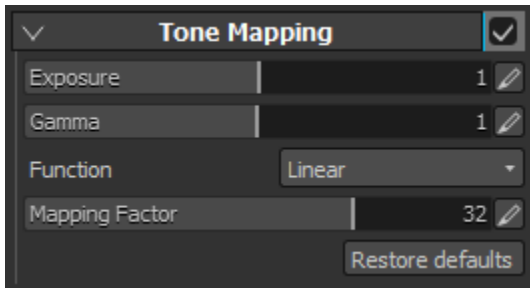
The Tone Mapping parameters allow to control how the colors will be scaled to be displayed on the screen.
Those settings can be useful to redistribute colors because of their wide range of values (which can exceed what the current screen is capable of displaying).

Substance Painter outputs **HDR** (High Dynamic Range) colors (in Linear Gamma space), but most screens only allow to visualize **LDR** (Low Dynamic Range) colors.
In order to map the HDR range to the LDR range, a conversion has to be done. This is the principle of the tone mapping.

Setting	Description
Exposure	Scales the HDR space rendering results before any glare effects are applied or tone mapping takes place.
Gamma	This is the gamma value for gamma correction.
Function	Function to use to map the HDR range to the LDR range. Available functions are: • **Auto**: The tone map function is selected automatically. Default is **Sensitometric**. • **Linear**: The output color is not clamped to 0 to 1 for this type only. This is optimal for when implementing some effect in the HDR space on the application side after the applying of the effects. We do not recommend this unless you have some specific reason for using it, because the high luminance components will be completely lost and blown out highlights will occur if linear mapping is used as the final screen output as is. • **LinearSat**: This is almost the same as **Linear**, except that the output color is clamped. Also, glare synthesis is a little smoother than **Linear**. • **Sensitometric**: Default function when scene rendering is performed in the HDR space. • **Reinhard**: This results in mapping that is more gradual than **Sensitometric**, and contrast that is slightly low. Accordingly, it causes the resolution of the high luminance components to become high, and stronger reproduction of the luminance variations in the bright portions. • **ReinhardLum**: Type for implementing the **Reinhard** tone map with the luminance as the reference and keeping the original saturation (vividness: RGB ratio). Maps only the luminance

	information to the LDR space and then reproduces the original saturation. The saturation in the HDR space is also kept after tone mapping. • **Log**: This results in mapping that is even more gradual than **Reinhard**, and contrast that is low. It causes the resolution of the high luminance components to become high, and the strongest reproduction of the luminance variations in the bright portions. • **LogLum**: Type for implementing the tone map of the logarithmic space with the luminance as the reference and keeping the original saturation (vividness: RGB ratio). This maps only the luminance information to the logarithmic space and then reproduces the original saturation. The saturation in the HDR space is also kept after tone mapping.
Mapping Factor	This controls the maximum level of the luminance (brightness) in HDR space that is mapped to the final LDR space in the tone mapping process. Colors brighter than the specified HDR space luminance cannot be represented in LDR space, resulting in blown out highlights. In concrete terms, this value is the luminance (after exposure scaling) in HDR space that maps to the maximum luminance value (1.0) in LDR space. In HDR rendering mode, the lower this value is, the higher the contrast and the greater the likelihood of blown out highlights. Conversely, specifying higher values results in lower contrast and decreases the likelihood of blown out highlights. In LDR rendering mode, when a remapping to HDR space takes place in order to apply an effect, the luminance range is expanded up to the value specified in **Mapping Factor**. Conversely, the **Mapping Factor** luminance is mapped to the maximum LDR luminance during tone mapping. In other words, this specifies the dynamic range scaling factor applied to the LDR rendering results for the application of effects. Setting this to a high value emphasizes bright regions in effects. > This setting will have no effect (it will be ignored) if the **function** is set to any of the following in HDR rendering mode: **Linear**, **LinearSat** or **Sensitometric**.

Glare
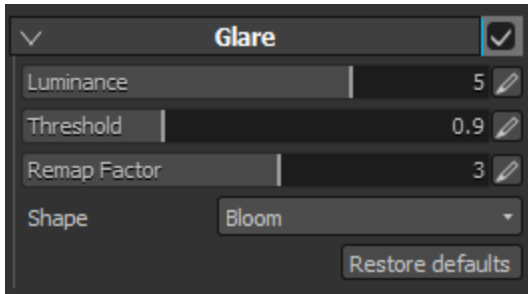
Description of the parameters :

Setting	Description
Luminance	This is the overall brightness of the glare effect. Setting this to 0.0 completely disables the effect. Realistic values occur in the range of about 0.5 to 4.0, up to a maximum of about 16.0.
Threshold	Only pixels brighter than the threshold are extracted to generate glare. For natural-looking results, values between 0.0 and 1.0 are recommended.
Remap Factor	Specifying a value other than 1.0 results in the extracted high-luminance component being further non-linearly expanded (or compressed). If you pass a value higher than 1.0, the glare becomes stronger for bright pixels. Use this when to adjust the luminance mapping of the glare in isolation, without impacting other effects. The luminance after the bright pass increases in a smooth curve, with luminance values of 1.0 approaching **Remap Factor**, and those greater than 1.0 approaching (**Remap Factor** ^2).
Shape	The shape defines the look of the glare, different models are available : • **Bloom** : Only bloom effect. • **Lens Flare:** Bloom / ghosts(lens flare) / afterimage. • **Standard:** Type including a good balance of all the basic elements. • **Cheap Lens:** Sharp ghosting and other representations of a cheap lens. • **After Image:** Type with very strong afterimage. • **Filter Cross Screen:** Lens with generator of cross-shaped star filter attached. • **Filter Cross Screen Spectral**: Lens with generator of cross-shaped star filter with strong spectrum attached. • **Filter Snow Cross**: Lens with generator of star filter in six directions attached. • **Filter Snow Cross Spectral**: Lens with generator of star filter with strong spectrum in six directions attached. • **Filter Sunny Cross**: Lens with generator of star filter in eight directions attached. • **Filter Sunny Cross Spectral**: Lens with generator of star filter with strong spectrum in eight directions attached. • **Horizontal Streak**: This lens flare type produces strong horizontal star streaks. • **Vertical Streak**: Type with strong star streaks in the vertical direction. Smears for CCD digital camera, etc.

Shape examples

Bloom

Lens Flare

Standard

Cheap Lens

Filter Cross Screen

Filter Cross Screen Spectral
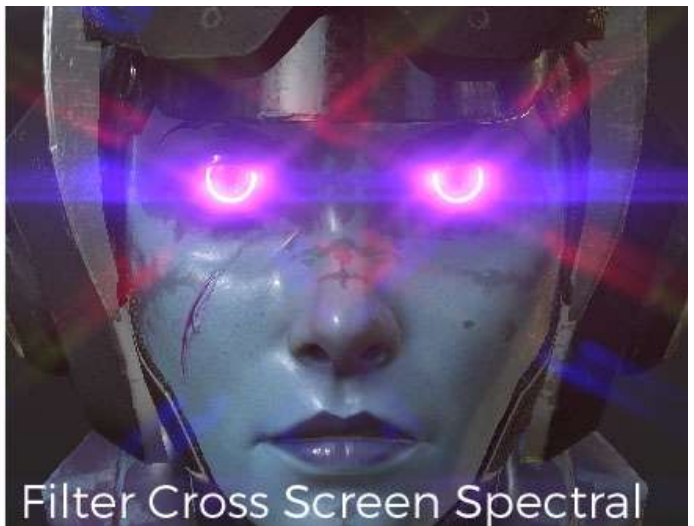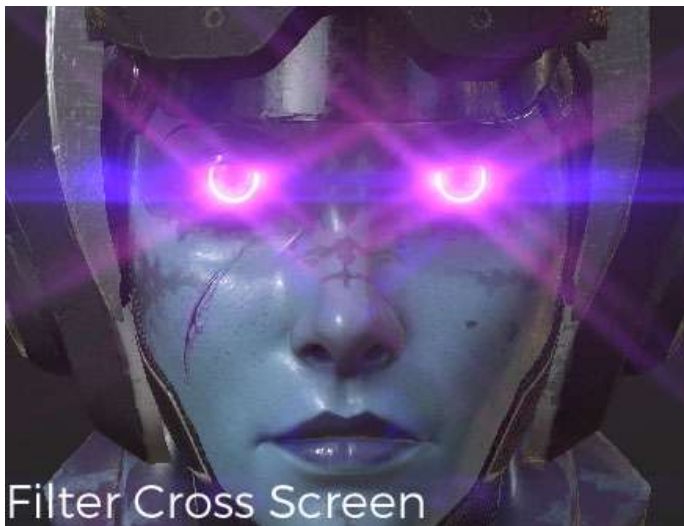
Filter Snow Cross

Filter Snow Cross Spectral

Filter Sunny Cross

Filter Sunny Cross Spectral

Vertical Streak

Horizontal Streak

Vignette
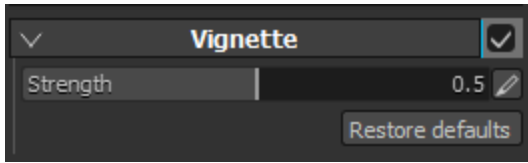
The Vignette effect darken the corners of the viewport to simulate a camera shadow.

Lens Distortion
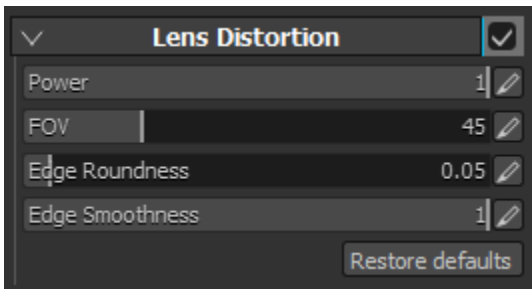
Lens Distortion is an optical phenomenon resulting in a swelling or shrinking towards the perimeter of the image. The swelling is referred to as barrel distortion, and shrinkage is referred to as pincushion distortion.
The better the camera lens, the less these phenomena will occur. This effect can be used to simulate imperfect lens and therefor more realistic images.

Setting	Description
Power	Controls how fast the distortion is applied from the edges of the screen.
FOV	Controls the amount of lens distortion (simulated Field Of View).
Edge Roundness	Controls the round shape at the edges or the viewport.
Edge Smoothness	Controls the hardness/smoothness of the black edges of the viewport.

Sliders
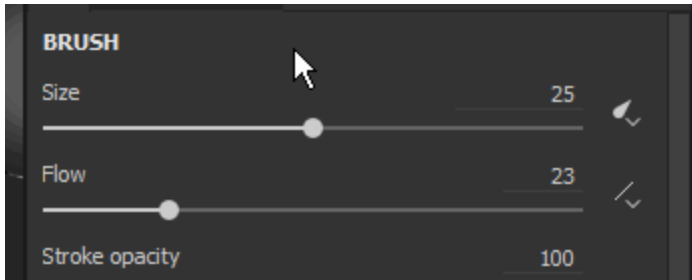
There is an option to control the slider values with the keyboard Up/Down arrows. All sliders have a "precision" mode activated when pressing the Shift key.
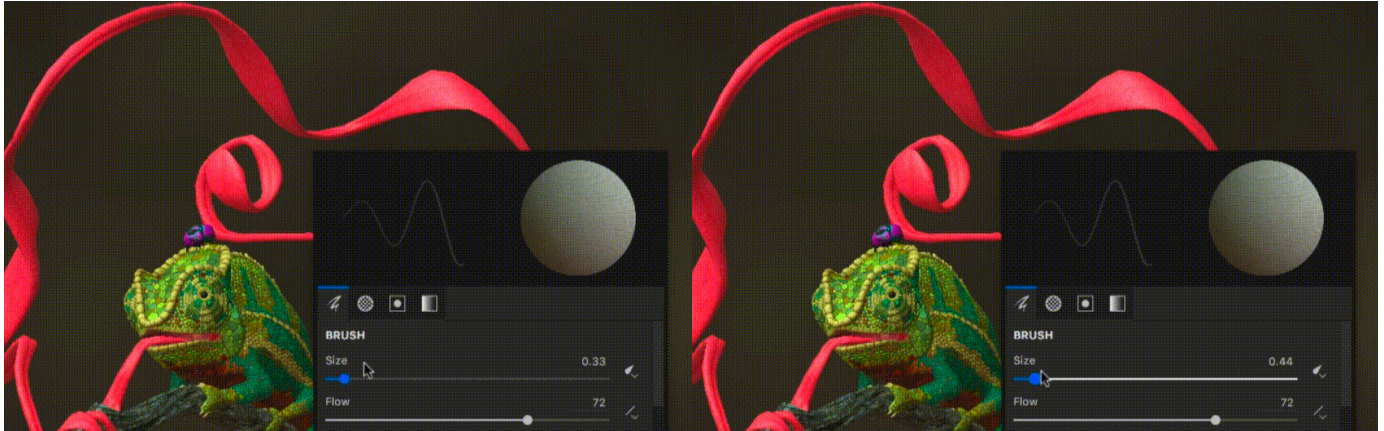
Painting Tools

Painting tools are accessible directly via the toolbar (or their dedicated shortcut):

When a paint tool is selected, its properties are displayed in the properties window.
The Paint, Eraser and Projection tool share similar settings and properties. However the geometry decal use a different kind of parameters.

For information about each tool, see their dedicated page:

- Paint brush
- Eraser
- Projection
- Polygon Fill
- Smudge tool
- Clone Tool

We also have tutorials available :

Paint brush

The Paint Tool is the most common paint brush. It allows you to paint simple colors, masks or even full materials.
It can be combined with particles or more advanced mask (like stencils) to create complex patterns very easily.
The Paint tool properties are split in different parts to make it easier to manage.

Paint / Physical Paint
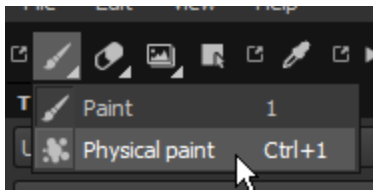
- **Paint** : Regular paint tool based on brush presets that can be used on layers/masks.
- **Physical Paint** : Paint tool with physics properties based on particles presets.

Brush properties

The brush properties allow to configure and control the behavior of the brush strokes when painting in the viewports.

The brush preview allow to tweak and visualize the result a brush before testing it out on the mesh :

- **Size** : Size of the gizmo and the strokes. Dependant of the Size Space (see below).
- **Flow** : Cumulative opacity of the brush. Affect the intensity at which the brush stroke will be applied on a surface (affect all channels of the current material).
- **Spacing** : when doing long brush strokes (like drawing a line) this parameters will control the space between each stamps performed during the stroke.
- **Angle** : Control the rotation of the brush, useful when using non-uniform alpha masks. Goes from **0** to **360** degrees.
- **Follow Path** : if enabled, the stamps inside a brush stroke will be drawn by following the direction of the stroke. (Useful when painting stitches for example.)

There are a few shortcuts to quickly control some of these properties :

- Ctrl + Right Mouse + Drag **left-right** = change size.
- Ctrl + Right Mouse + Drag **up-down** = change hardness.
- Ctrl + Left Mouse + Drag **left-right** = change flow
- Ctrl + Left Mouse + Drag **up-down** = change rotation.

- **Size Jitter** : Choose a random size in the given percentage (from 0 to 100) with the Size defined above being the maximum.
- **Flow Jitter** : Choose a random flow in the given percentage (from 0 to 100) with the Flow defined above being the maximum.
- **Angle Jitter** : Choose a random angle in the given range (from 0 to 180) in addition to the Angle defined above.
- **Position Jitter** : Choose a random position in the given percentage (from 0 to 100) in addition of the original brush stamp position.

- **Alignment** : Indicate in which direction the stamp in a brush stroke will be projected.

- **Backface culling** : if enabled, it use the angle defined in the interface as a way to ignore other surfaces when painting.
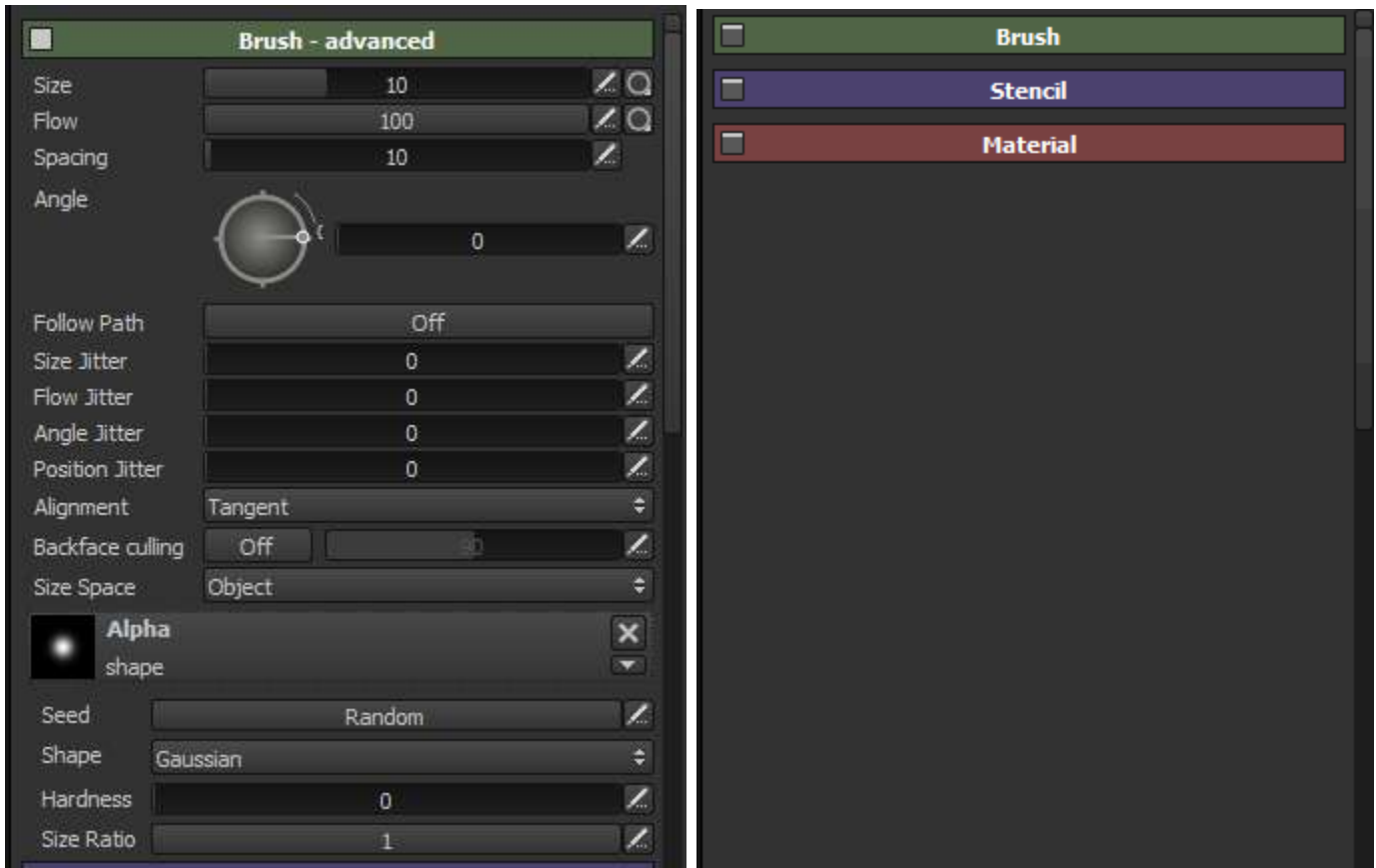
Straight lines

It is possible in Substance Painter to paint straights lines instead of drawing hand free.
Note that straight lines are drawn in screen/viewport space.

- Press and maintain **SHIFT** over the viewports to display the straight line gizmo
- Press and maintain **SHIFT + CTRL/COMMAND** to enable the snap system.
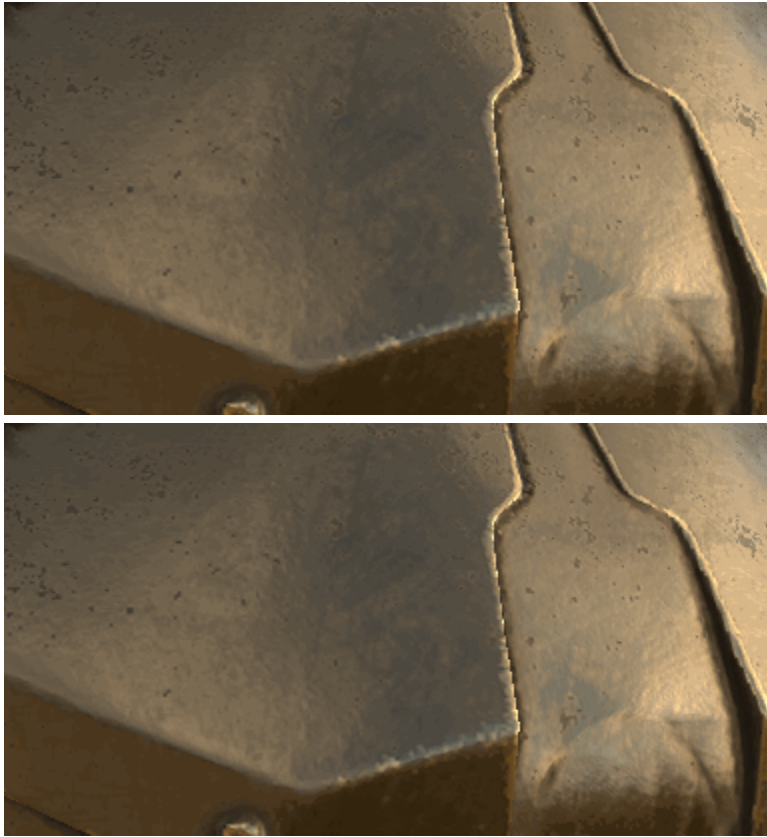
Stencil

The stencil is an additional mask that is applied in screen/viewport space. It allows to combine the alpha of the brush with a more advanced mask. You can load a regular bitmap or a substance as a stencil. The stencil will always be considered as a grayscale mask however.

- It is possible to scale, rotate and translate the stencil over the viewport at anytime.
- The opacity of the stencil is defined by the flow setting (in the brush properties).
- It is possible to change the opacity of the stencil when display on the viewport via the viewer settings.
- It is possible to hide temporarily the stencil by pressing **W** on the keyboard
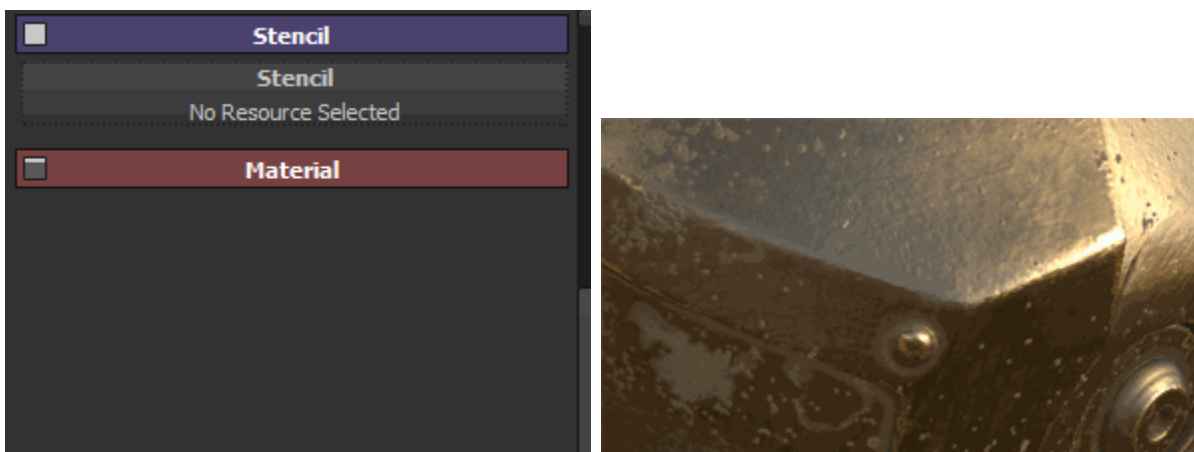
It is possible to edit the stencil transformation by pressing the **shortcut S** :

- Use **S + Left Mouse click** to rotate the stencil.
- Use **S + Left Mouse click + SHIFT** to snap/constrain to rotation of the stencil.
- Use **S + Right Mouse click** to Zoom/Unzoom the stencil.
- Use **S + Middle Mouse** click to translate the stencil.

Material

The material parameters define what material will be painted on the mesh. A material can be a composite of multiple channels and can control selectivity, colors and surface details.

- It is possible to just use color/grayscale values on a brush.
- It is possible to load bitmap/substance in individual channels.
- It is possible to use Material presets or Substance as a full material directly (via a drag and drop from the shelf or a single click).
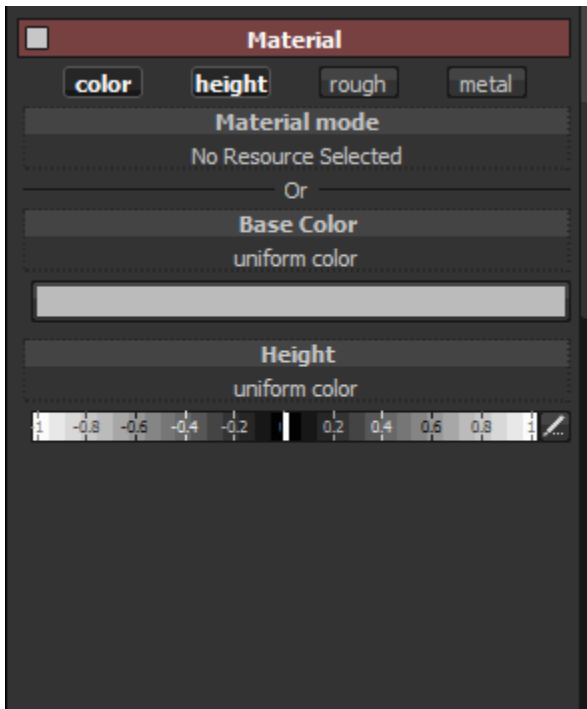
In certain situation, it might be easier to paint only specific channels of the texture set. To do so it is possible to disable a channel by clicking on the dedicated button :
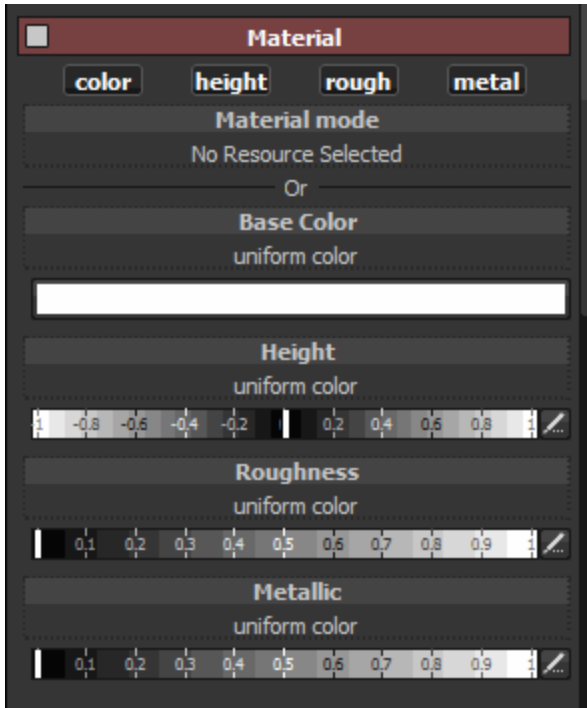
Creating Particles Presets

You can use Popcorn Editor to create particles presets.

- Popcorn particles: setup
- Popcorn particles: HowTo
- Quick walk through: from PopcornFX to Substance Painter

Popcorn particles: setup

Introduction

Substance Painter uses PopcornFX particles system (.pkfx files) to define the particles behavior.

The Particles Brushes are composed of 2 PopcornFX particle systems: the Emitter and the Receiver.

Substance Painter loads the Emitter and overrides collision events to emit the Receiver.

PopcornFX editor installation

Download and install the Editor:

PopcornFx-Editor_Setup_v1.5.5.20787.exe

Here is an access to PopcornFX Editor wiki (you can keep it in a corner of your screen for the next steps) :

http://wiki.popcornfx.com/

Popcorn particles: HowTo

The following "how-to"s cover different aspects of PopcornFX. Some parameters or windows name can vary due to the version you use.

Viewport setup

How to import your own mesh

Copy-paste your mesh in the "Meshes" folder of your Pack. Then in the Editor open your mesh and click on "Build".

Now, in your particle system, go to "Backdrop" in the treeview, right-click on "3D Layers", "New Backdrop", "CNEdEditorBackdrop_Model3D", and select your mesh in "resource model".

In Substance Painter, the Mesh is scaled to be inside a box of size [-1;1] on each Axis. To get the right scale with Substance Painter in the Editor, you should either import a mesh which is already scaled to fits in that box (easy way), or play with Scales in the Editor.

Note: only FBX mesh format are supported.

How to display the grid

Ctrl-G. You can customize the color of the grid in "Editor Properties" "GridColor".

Emitter

How to create "OnCollide" events

The Physics Evolver handles collision with backdrop meshes in the scene. In Substance Painter the scene will be your mesh.

First in the Physics Evolver set "WorldInteractionMode" to "OneWay" to enable particle collision. Then create an event called "OnCollide", the Physics Evolver will trigger it on collision with the scene.

In Substance Painter, the scene is the model you are working on, and all events called "OnCollide" will be overridden by the Emitter particle system of the current brush.
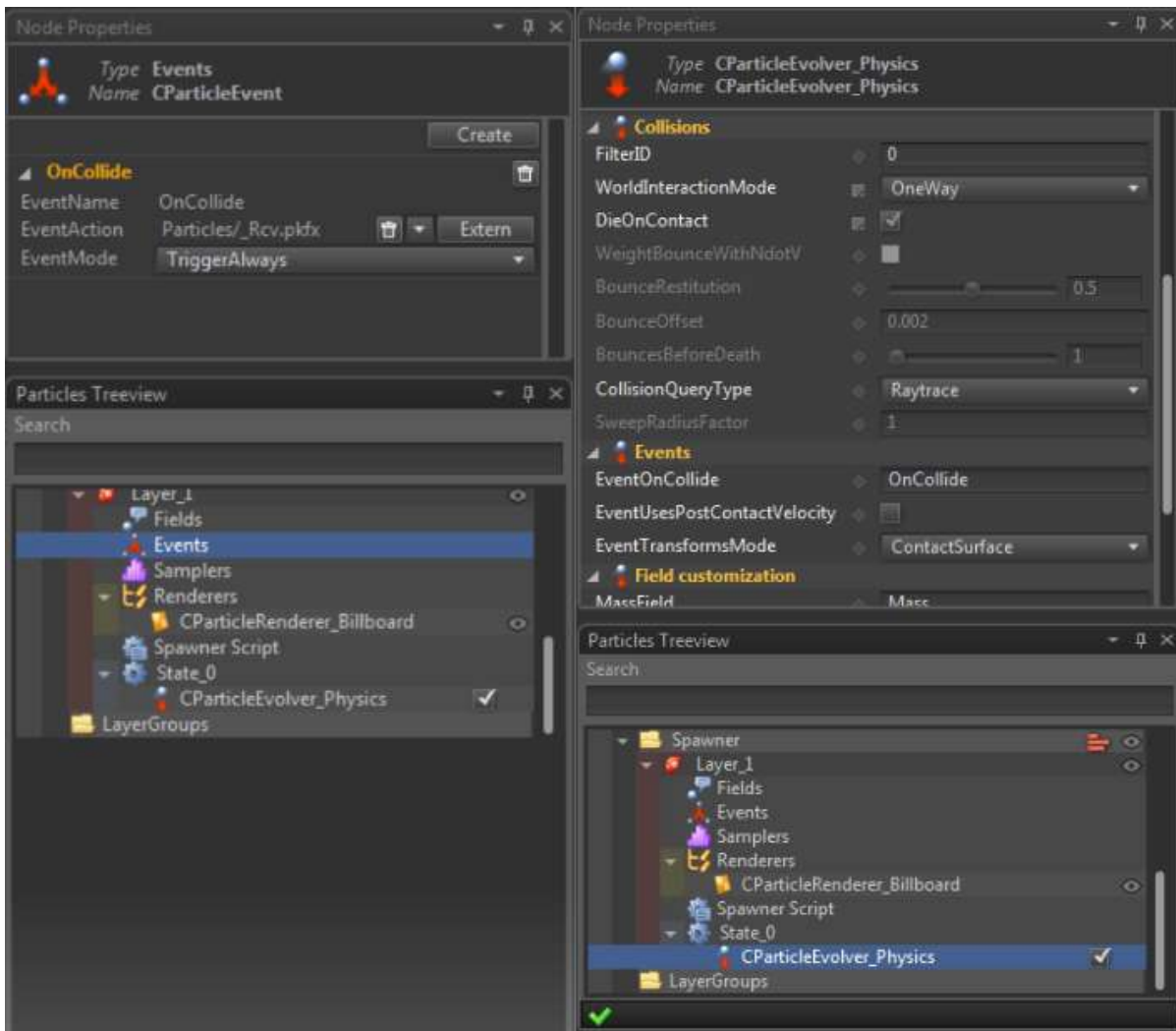
How to fire particles from the camera

On the top of the viewport, enable the 4th button "Constrain spawns on camera plane".

Substance Painter will by default fire Emitters from the camera.

How to emit particles on the top like rain

Disable "Constrain spawns on camera plane" if enabled.

Create a Particle Attribute called "Global", now Substance Painter will spawn your particles at the origin.

To spawn on the top of the mesh, add a Shape Sampler BOX or CYLINDER, place it on top, and sample it in your Spawner Script.

For example with a Shape Sampler BOX called "Spawn", add this to your Spawner Script:

Position = Spawn.samplePosition();

Receiver

To get even closer to the Substance Painter workflow while editing your Receiver, you can setup the Editor to override the particle system spawned.

In the treeview of your Receiver, select "Editor Properties", then enable "UserOverSpawn" and select your emitter in "OverSpawnEffect".
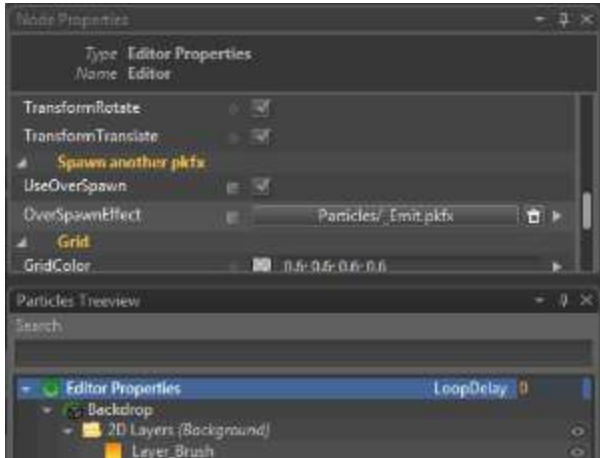
You still must open your Emitter to set the "OnCollide" events to spawn the Receiver you are currently editing.

How to setup particle fields
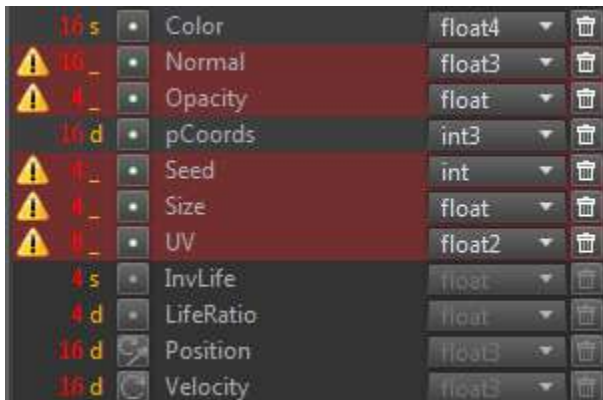
Here is the description of the particles field you must have in your Receiver:

"Size" float

The multiplicator of the brush size in Substance Painter.

"Opacity" float

The multiplicator of the brush opacity in Substance Painter.

"UV" float3

The texture coordinate on the mesh of particles.

In a Evolver Script, sample your Shape Sampler "Mesh" with the parametric coordinate given by the Projection Evolver:

UV = Mesh.sampleTexcoord(pCoords);

"Normal" float3

The normal of the mesh surface beneath particles.

In a Evolver Script, sample the Shape Sampler "Mesh" with the parametric coordinate given by the Projection Evolver:

Normal = normalize(Mesh.sampleNormal(pCoords));

"Seed" int

Just a randomly generated value for Substance Painter:

In a Evolver Script add:

Seed = int(rand(0,20000000));

"pCoords" int3

Not used by Substance Painter, but indispensable to do the particle projection on the mesh and sample other fields.

How to project particle on the mesh

Add a Projection Evolver in the "State_0" of your Receiver.

Each frames, the Projection Evolver will project particles on the nearest surface of a Shape Sampler.

The Projection Evolver can fill out the parametric coordinate of the projection in the particle field specified by "OutputParametricCoordsField" (see "pCoords" particle field).

And it can reproject a vector on the surface of the mesh with "ReprojectedField".

Here, we want to project particles on the Sampler Shape "Mesh", fill out parametric coordinates in the int3 particle field "pCoords", and project the "Velocity" on the surface too:
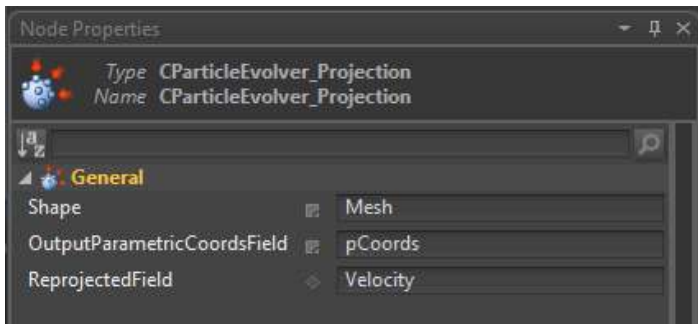
How to sample the mesh

In Substance Painter, all Shape Samplers called "Mesh" and of "ShapeType" "MESH", will be overridden with the mesh used in Substance Painter.

In the Editor, set it to the same mesh as your backdrop.
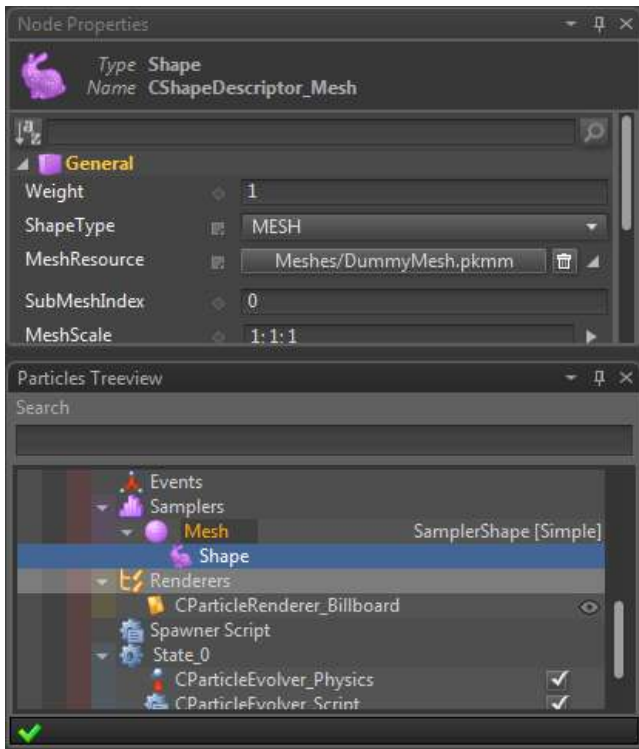
To sample things in a Script, just write "Mesh.sample~Something~(pCoords)" in a Script, here is the documentation:

http://www.popcornfx.com/wiki/index.php/CParticleSamplerShape#Script_bindings

Some useful code snippets you will need:

// UV is the texture coordinate of the particle on the mesh

// Must be after CParticleEvolver_Projection

UV = Mesh.sampleTexcoord(pCoords);

// Normal is the Normal of the surface on the mesh just below the particle

// Must be after CParticleEvolver_Projection

Normal = normalize(Mesh.sampleNormal(pCoords));

Global tips

How to import Emitter/Receiver in Substance Painter

In Substance Painter, do "File" > "Import particles" or Ctrl-Alt-R then choose your Emitter.pkfx or Receiver.pkfx in you Pack.

Substance Painter will automatically detect requirements (particle fields, OnCollide events) to decide if your pkfx is either an Emitter, Receiver or nothing compatible.

Now, you should see your Emitter/Receivers in the Shelf.

How to debug particle with a viable particle size

As the "Size" particle field must be between 0 and 1 to be a multiplier of the brush size in Substance Painter, particles will be far too big in the Editor. So, add a custom field float "BBSize" set to 0.01 in the Spawner Script, to be used in the Billboard Particle Renderer as the "SizeField" to better see particle.

How to not mess up with evolver order

The order of the evolver can be very important.

For example, you might want to always have your 2 last evolvers to be the Projection Evolver then the Script Evolver which samples the UV and Normal with the pCoords generated by the Projection Evolver.

Keep in mind that the order of the evolvers is literally the order of execution inside a frame, and that Substance Painter will gather particle field values and the end of each frame.

How to sample the mesh's normal map

Substance Painter will replace all Texture Samplers called "NormalMap" with the normal map of the mesh (if imported).

Thats the only texture you can have for now, all other texture will not be accessible by Substance Painter.

Once you have add you Texture Sampler called "NormalMap", you can sample it in a script :

http://www.popcornfx.com/wiki/index.php/CParticleSamplerTexture

Some useful code snippets:

```
// In Evolver Script

// Convert the NormalMap texture in tangent space to world space normal

// /!\ the "Normal" particle field must always be the normal of the mesh not influenced by the normal map

// /!\ dont forget to initialize your particle fields in your Spawn Script

//     otherwise pCoords and Normal will be invalid at the first update

float      normalFactor = 1.0; // change the intensity of the normal map

float3   meshnormal = Normal;

float4   rawtangent = Mesh.sampleTangent(pCoords);

float3   binormal = normalize(cross(meshnormal, rawtangent.xyz) * rawtangent.w);

float3   tangent = normalize(cross(meshnormal, binormal));

float3   tsNormal = normalize(((NormalMap.sample(UV).xyz * 2.0 - 1.0).xyz) * float3(-normalFactor, normalFactor, 1));

float3   normal = normalize(tsNormal.x * tangent + tsNormal.y * binormal + tsNormal.z * meshnormal);
```

How to create turbulences

In the Editor, create a Turbulence Sampler.

http://www.popcornfx.com/wiki/index.php/CParticleSamplerProceduralTurbulence

Then you have 2 way to sample the Turbulence and affect particles:

The easy way

In the Physics Evolver of your layer, set "VelocityFieldSampler" to your Turbulence Sampler name, and set "Drag" to a value > 0.

The parameterized way

You adjust turbulences with attributes by sampling the velocity field generated by your Turbulence Sampler in a Evolver Script:

Create 2 Particle Attributes:

- float "TurbulencePower" minmax: [0;5]
- float "TurbulenceScale" minmax: [0.001; 5] (needs to be > 0)

Then create 3 Particle Fields:

- float "TurbPower" and float "TurbScale"

    To store attribute in them in the Spawner Script:

    TurbScale = 1.0 / TurbulenceScale;

    TurbPower = TurbulencePower;

- float3 "VelocityField" in rotate mode

    It will be used as the "VelocityField" in the Physics Evolver (already set by default to the field "VelocityField").

So before your Physics Evolver, in a Script Evolver, sample your Turbulence Sampler called "Turb":

VelocityField = Turb.sample(Position * TurbScale) * TurbPower;

How to correctly use dt, the delta time

Delta time is the simulation time in seconds between each frame updates. In the Editor the delta time is updated with the real elapsed time. In Substance Painter the delta time is fixed, and each updates is launched as soon as le last one is finished.

A game running at 60 FPS will have a delta time of 1/60= 0.016 seconds, so try to get your brushes running around 0.016s of delta time.

- Big deltas time > 0.016s

- PRO fast update

   As the time between updates is large, the movement of particles will be larger, so the Brush will run faster in Substance Painter.

- CON approximation

   PopcornFX is a kind-of big discretisation system, so bigger the dt is, bigger the imprecisions will be. See large delta time implication on turbulences: http://www.popcornfx.com/wiki/index.php /CParticleEvolver_Physics#Dealing_with_turbulences_at_low_framerates

- CON splats

   If the delta time is large, particle movement between frame is large too. So, in Substance Painter little spots might appears instead of straight lines.

   This happens because Substance Painter will draw one stroke point for each particles at the end of each frames, and don't draw lines for each particles between the last and current frame.

- Little delta time < 0.016s

- PRO precision

   Smaller is the delta time, smaller distance between brush strokes will be, so sharper will be the drawing. And the discretisation of the simulation will be better too.

- CON slow

   Smaller is the delta time, greater the number of updates will be necessary to draw the same distance distance.

Final tips on delta times: a good way to get the to right dt could be to start with a large one (0.1s) then decrease step by step to get the result you want.

How to expose parameters of your particle system

Substance Painter will gather Particle Attributes of particle systems and expose them in the Physic Brush parameters:

http://www.popcornfx.com/wiki/index.php/Particle_effect_attributes

In PopcornFX you have the feature called "Attributes in Evolve" which allow you access Attribute in Evolve scripts: do not do that. Instead create particle field and store attribute in them in the Spawner Script, then use those particle field in Evovler Scripts. (this could be fixed in the future)

How to detect problematic particles

You should never have particles with weird particle field values, so make sure you break on problematic from times to times:

http://www.popcornfx.com/wiki/index.php/Particle_tips_BreakOnProblematicParticle

How to resolve particle systems problems in Substance Painter

In the Substance Painter installation directory, you should find a file called "popcorn.htm". This file contain all the logs of PopcornFX, take a look inside to see what could happen wrong.

How to correctly initialize particle fields

To get valid pCoords UV and Normal from the first frame, add this to your Spawner Script:

// PostEval() will be called after particles have been translated to their respective spawn locations

// so, PostEval() is executed in world space

```
function void       PostEval()

{

    // we need to initialize correctly the values needed by Substance Painter:

    pCoords = Mesh.projectParametricCoords(Position);

    UV = Mesh.sampleTexcoord(pCoords);

    Normal = normalize(Mesh.sampleNormal(pCoords));

}
```

Quick walk through: from PopcornFX to Substance Painter

Download the pre-setuped PopcornFX Package: Templates_EmitterReceiver.pkkg

This package is a "start kit" that contains an emitter and a receiver we will edit and import in Substance Painter.

Popcorn fx setup

Launch PopcornFX Editor, create a new project, then open it.

In your project, right-click on an empty area and select "Import Popcorn Package". Then choose "Templates_EmitterReceiver.pkkg".

Now, you should have:

- A particle system "_Emitter" which is a base template of an Emitter.

- A particle system "_Receiver" which is a base template of a Receiver.

- A sphere mesh used as the default backdrop of the scene

"_Emitter" and "_Receiver" are already "Substance Painter ready". They have already been configured with the necessary evolvers, fields, backdrops etc…

Import your mesh

PopcornFX only supports **FBX**, be sure to export your mesh in this format. During the export step, check the size of your mesh to try to fit with correct units in "real world".

Copy-paste it in the "meshes" folder of your project (in PopcornFX, you can right click on the "meshes" folder and select "Open File Location").

Come back to the editor, open your mesh (double click on it) and click on "**Build**". Close the window, and save the change.

Emitter/Receiver editing

We will duplicate existing particles systems and adapt them to correctly take the new mesh into account.

Right-click on the particle system "_Emitter" (in the "Particles" folder), and select "Clone" (or "Duplicate") to create your own Emitter.

Open it and, in the "Particle Treeview" window (bottom left), select "**Layer_Model**" which should be located in : "Editor Properties => Backdrop => 3D Layers".
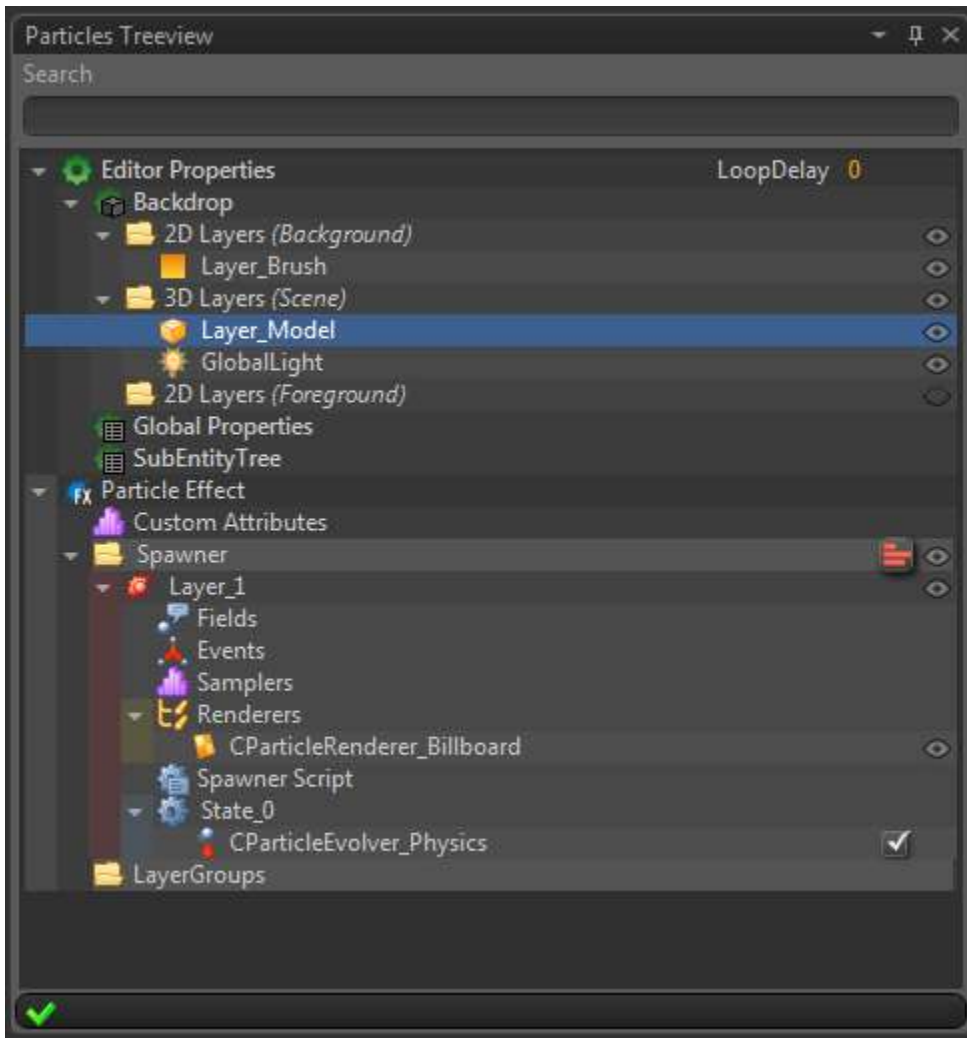
Then, in the "Node Properties" window replace "dummymesh.fbx" by your model. Save the modification (File => Save) and close the emitter window.

Now, **clone "_Receiver"** (in the "Particles" folder), to create your own Receiver from this one.

Open it and, as for the emitter, replace the dummy mesh by your model in "Layer_Model". We **modified the mesh displayed at the screen**, but we also need to modify **the mesh used by the particles**.

To do so, in the "Particle Treeview" window, click on "**Shape**" which should be located in : "Particle Effect => Spawner => Layer_1 => Samplers => Mesh".

Then, replace the "MeshResource" by your model.

Once it's done, there is one last thing to do: we need to "link" the emitter and the receiver with the one we have just created.

In the treeview of your Receiver, select "Editor Properties", then select your emitter in "OverSpawnEffect". Save the receiver.

Open your emitter (the one we previously duplicated) and in the "Particle Treeview" window, click on "Events" which should be located in : "Particle Effect => Spawner". Then replace the receiver by your receiver by clicking on "Extern".
It's done! Now if you select the 3D view (of your emitter or receiver), you can create particles by pressing "space" button.
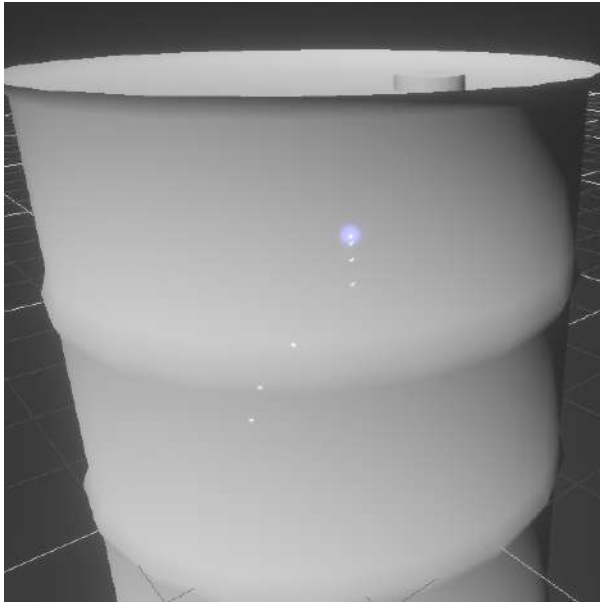
Optional: modify the receiver behavior

Open your receiver, and in the "Particles Treeview" window, select "CParticleEvolver_Script" (the top one which is dedicated to you :)) which should be located in : "Particle Effect => Layer_1 => State_0".

In the "Specialized Node Editor" window, in the function, add "Life = 0.5;" to change the particles lifetime. Then use "Ctrl+s" shortcut to save you script. You should be able to notice the difference in the 3D view.

For more informations on how it works visit the link below:

http://wiki.popcornfx.com/index.php/Main_Page

Import Emitter/Receiver in Substance Painter

In Substance Painter, do "File" > "Import particles" or Ctrl-Alt-R then choose your Emitter and your Receiver (both in .pkfx format) in you Pack.

Substance Painter will automatically detect requirements (particle fields, OnCollide events) to decide if your pkfx is either an Emitter, Receiver or nothing compatible.

Now, you should see your Emitter/Receivers in the Shelf (in "Emitters" and "Receivers" tabs).

To use them, you first need to click on the "Toggle particles" button.
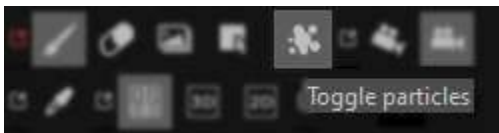
Then, in the "Tool" window, in "Physics" you'll have the possibility to select your emitter (to replace "default_emitter") and your receiver (to replace default_receiver).

You can now right click in the "Tool" window and save the tool.

Eraser
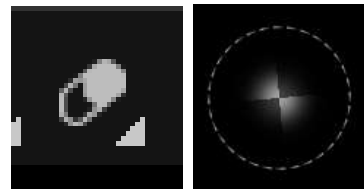
The eraser is a special tool that allow to erase/remove content from layers.

- It can be either on the content or the mask of the layer.
- The particles can also be used with the eraser to combine their effects.
- The eraser share the same type of parameters as the paint tool.
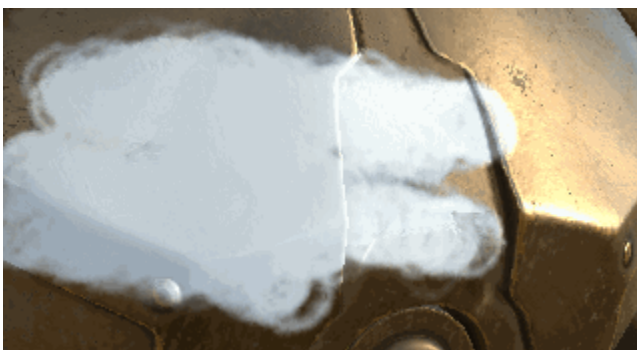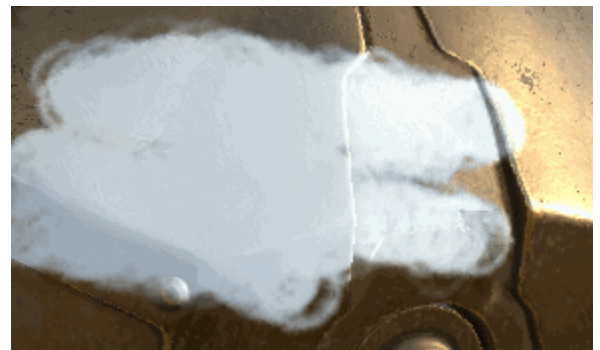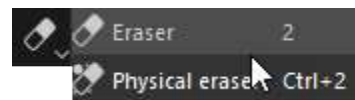
- **Eraser** : Special Paint too to remove content on a layers/masks.
- **Physical Eraser** : Paint eraser with physics properties based on particles presets.

Projection

The projection is a tool that allow to paint a material by projecting it in screen/viewport space. It shares similar controls to the stencil.

It is possible to edit the projection transformation by pressing the **shortcut S** :

- Use **S + Left Mouse click** to rotate the stencil.
- Use **S + Left Mouse click + SHIFT** to snap/constrain to rotation of the stencil.
- Use **S + Right Mouse click** to Zoom/Unzoom the stencil.
- Use **S + Middle Mouse** click to translate the stencil.
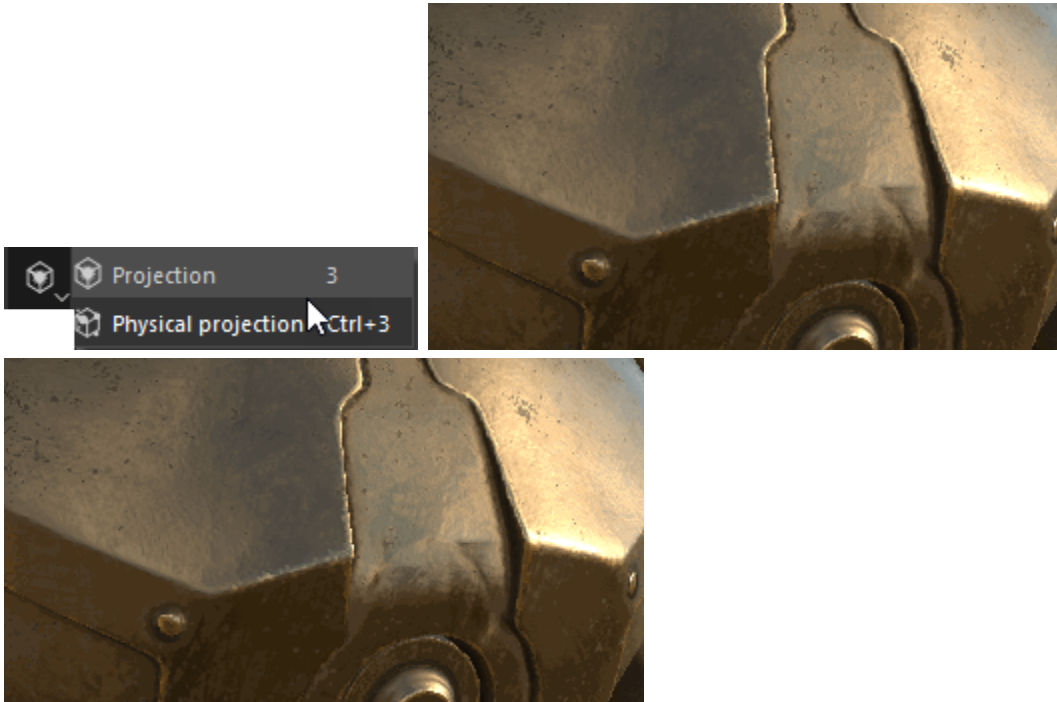
- **Projection** : Paint tool based on screenspace projection. This tool will display and repeat a pattern over the viewport.
- **Physical projection** : Projection paint tool with physics properties based on particles presets.

Polygon Fill

The Selection / Fill tool allows you to draw masks quickly by selecting polygons, mesh elements or UV chunks. Activating the Selection tool displays the wireframe of the mesh as an overlay. Its opacity can be tweaked through the Viewer Settings.

When you are **not** in Quick Mask mode (shortcut: T), using this tool will **fill the current layer** with the color currently selected in the Properties panel. It is mostly useful for creating layer masks. When in Quick Mask mode, the tool will only modify the quick mask.

Smudge tool

Introduced in Substance Painter 2 the smudge tool shares the same type of parameters as as the paint tool.

Usage

The simplest way to use the smudge tool is to use it directly on the content of a painting layer, as a regular paint tool.

A smarter way to use the smudge tool is to create a painting layer and set all the channels of the layer to the "Pass through" blending mode. This will allow to smudge in a non-destructive way over all the layers located below the "smudge layer". The layers below remain intact and all the modifications applied later will be taken in account by the smudge layer.

Clone Tool

Introduced in Substance Painter 2 the Clone tool shares the same type of parameters as as the paint tool. As its name suggests the clone tool allows you to duplicate the content of a specific layer or the full layer stack from one point to one another.

Usage

The simplest way to use the Clone tool is to use it on the content of a painting layer.

This can be done in 2 steps:

- Select the source location by placing the mouse on the model and pressing the "**V**" key.
- Then placing the mouse where the duplicated area will appear and start painting.

It is possible to update the source at any moment by pressing "**V**" again.
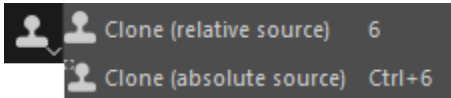
By default when painting with the clone tool, the source location will follow and update its location once the brush has been released. By disabling the button used for the "**Clone source behavior**", the source will go back where it was defined when pressing "**V**". This can be useful when painting multiple times with the same source area.

A smarter way to use the Clone tool is to create a painting layer and set the blending mode of all the channels to "Pass through". This will allow duplicate any information in a non destructive way from all the layers located below the "Clone layer". The layers below remain intact and any modifications applied later will be taken in account by the Clone layer:
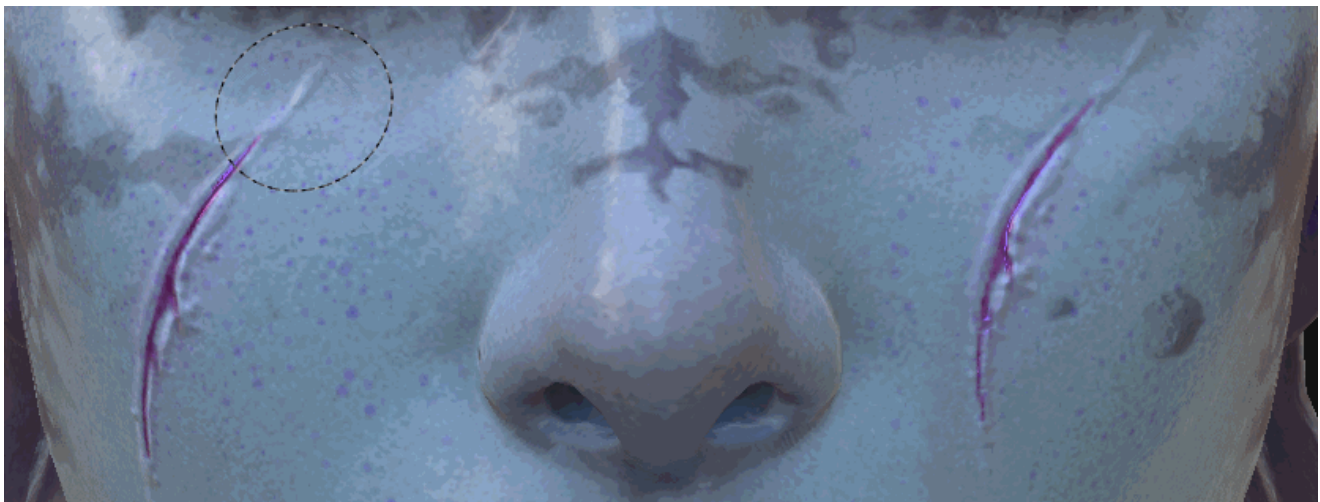
Features

Baking

Baking refer to the action of **transferring mesh based information into textures**. These information are then read by shaders and/or substance filters to perform advanced effects.
Most modern game engine and offline renderer use these baked textures. Baked textures are used in Substance Painter to add details and quickly texture an asset via advanced mask generators and filters. There are mandatory to be able to use Smart Materials for examples.

> Often baked texture are used to transfer information from a highly detailed mesh onto an other mesh will less geometry, allowing performance optimization when manipulating the lower mesh. This is why we refer these meshes as **high definition** and **low definition**.

For more details about the baking process, see the following pages :

- Baker List
- Matching by name

Baking window

The baking dialog can be accessed from the **Texture Set Settings** window :
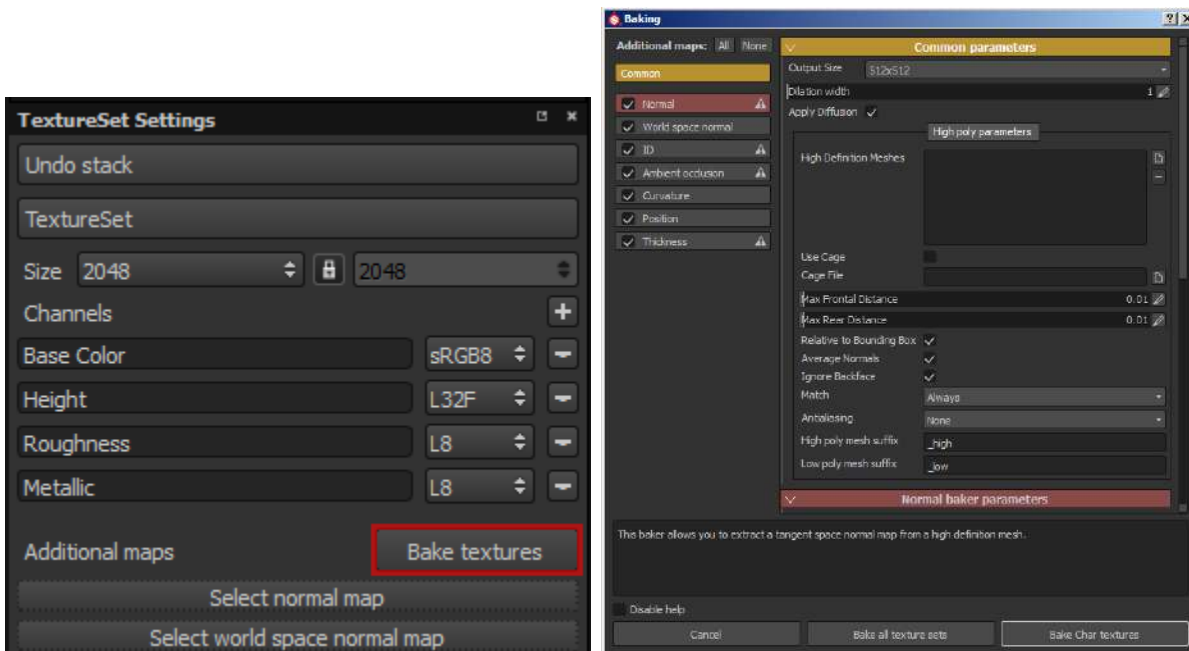
The baking dialog consists of **2 panels**.
The left part lists the available bakers while the right part shows all the bake settings you can adjust. The settings under the yellow tab are global and shared between all the bakers, while the red part is specific to the currently selected baker. It is possible to bake multiple texture set at the same time by using the "**Bake all texture sets**" button. The list of the currently enabled baker will be applied on all the other Texture sets in this case.

> Baked maps will automatically be plugged in the corresponding Additional Maps slots in your TextureSet Settings.

Baker List

- Normal
- World Space Normals
- ID
- Ambient Occlusion
- Curvature
- Position
- Thickness

Normal

This baker allows you to create a normal map from a high definition mesh.
You can bake either a Tangent Space normal map, or a World Space normal map.

Specific Parameters

Map Type: In the case of Substance Painter, a Tangent Space normal map will be baked.

Normal Orientation: The normal orientation (DirectX or OpenGL) is determined from the project settings.

Tangent and Binormal control

By default Substance Painter will use the tangent and binormals (also called bitangent) stored inside the mesh that was imported in the project. If this information is not available (for example a file format like OBJ doesn't support it) then this information will be recomputed based on the Mikktspace tangent basis (aka Mikkt).

World Space Normals

This baker allows you to extract a world space normal map from the model.

If a normal has been baked, it will be used in addition to the low-poly mesh to compute the world space normals.

Note that the normal orientation (OpenGL or DirectX) is determined from the project settings.

ID

This baker allows you to project **Vertex Colors**, **Material colors** or **Random colors** per sub-objects from a high definition mesh to the current model. It can be used to bake **zBrush Polypaint** or **Material IDs**.

Specific Parameters

Color Source:

- **Vertex Color:** reads the vertex color from the high definition meshes
- **Material Color:** reads the material color from the high definition meshes (only works for FBX files)
- **Mesh ID:** assign a color per object from the high definition meshes
- **Polygroup / Submesh ID:** assign a color per subobject (also called element) from the high definition meshes

Color Generator (only for Mesh ID and Polygroup/Submesh ID):

- **Random:** each object / subobject is colored by a random color
- **Hue Shift**: each object / subobject is colored by a unique hue
- **Grayscale:** each object / subobject is colored by a unique grayscale color

Ambient Occlusion

This baker uses the high definition meshes to compute the occlusion to produce accurate results and store them into a texture that match your low-poly mesh.

> You can also bake without an high-poly mesh, in this case the low-poly and its normal map will be used to compute the ambient occlusion.

Specific Parameters

Secondary Rays: amount of occlusion rays (the higher will produce less noise).

Min Occluder Distance: minimum distance where the occlusion rays will hit the high poly geometry**.**

Max Occluder Distance: maximum distance where the occlusion rays will hit the high poly geometry.

Relative to Bounding Box:

- **off:** units used in "Max Frontal Distance" and "Max Rear Distance" are the ones defined when exporting your mesh (m, cm or whatever you did set up in your scene export).
- **on:** units are relative to the bounding box of the object, 1.0 being the diagonal length of the bounding box.

Spread Angle: maximum spread angle of occlusion rays.

Distribution: angular distribution of occlusion rays.

Ignore Backface: defines if the rays should ignore hits on a backface (if the high poly normal faces the opposite direction as the low poly from where the ray is fired). You should want this option activated most of the time.

Attenuation: defines how occlusion is attenuated by occluder distance

Curvature

The curvature baker allows you to extract and store concave and convex information related to your mesh.

- The black values represent the concave areas
- The white values represent the convex areas
- The gray values represent neutral/flat areas.

Specific Parameters

Algorithm:

- Per Pixel: will compute the curvature map based on both the geometry and the input normal map
- Per Vertex: will compute the curvature map based only on the geometry

Details: a higher value will reveal more details in the curvature map

Enable Seams: if checked, seams will appear on the curvature map

Seams intensity: set the intensity of the seams. This works only if the option "Enable Seams" is checked

Position

The Position baker allows you to create position maps.

Specific Parameters

Mode:

- **All axis:** bakes the position on the x,y, and z axis in the rgb channels
- **One axis:** bakes a single axis in a greyscale image

Axis: if the "One axis" mode is selected, chose which axis should be baked

Normalization:

- **BBox:** normalize each axis according to the bounding box length
- **BSphere:** normalize all axis according to the bounding sphere

> It is recommended to use "**All axis**" and "**BSphere**" settings if you plan to use Mask generators that rely and Tri-Planar projections.

Thickness

The thickness baker is very similar to the ambient occlusion baker, but it casts the rays in the opposite direction of the surface normal. (So it's as if you were baking an AO with the normal inverted).

- The black values represent the thin parts of the model.
- The white values represent the thick parts of the model.

It can be used in a Sub Surface Scattering (SSS) shader or directly in the diffuse/albedo to fake a SSS effect.

Specific Parameters

Secondary Rays: amount of secondary rays (the higher will produce less noise)

Min Occluder Distance: minimum distance where the secondary rays will hit the high poly geometry

Max Occluder Distance: maximum distance where the secondary rays will hit the high poly geometry

Relative to Bounding Box:

- off: units used in "Max Frontal Distance" et "Max Rear Distance" are the ones defined when exporting your mesh (m, cm or whatever you did set up in your scene export)
- on: units are relative to the bounding box of the object, 1.0 being the diagonal length of the bounding box

Spread Angle: maximum spread angle of occlusion rays.

Distribution: angular distribution of occlusion rays.

Ignore Backface: defines if the rays should ignore hits on a backface (if the high poly normal faces the opposite direction as the low poly from where the ray is fired). You should want this option activated most of the time.

Automatic Normalization: defines if the thickness map should be auto-leveled to make sure the brightest point is set to pure white and the darkest point is set to pure black.

Matching by name

What is baking by name matching ?

Name matching allow to filter the bakers to avoid mesh detection other than with specific meshes.
This give the ability to bake multiple meshes inside one texture at once without bleeding artifacts or the necessity to explode a mesh (by shifting parts away).

In order to be able to match a low poly mesh with its high poly, a suffix keyword needs to be defined to detect the common mesh name.

How to setup meshes names ?

Let's say the suffix are **_low** and **_high** (you can use the suffix that you want). So meshes from both low and high will match according to the name before the suffix.

Example :

- **body_low** matches with **body_high**
- **head_low** matches with **head_high**

Anything **after** the suffix is ignored.

Following the same example :

- **body_low** matches with **body_high_part1**, **body_high_part2**
- **head_low** matches with **head_high-glasses**, **head_highdetail**, **head_highwhatever**

No matter what is put after the suffix, it will be ignored.
This allows you to keep object separated while still making sure they match with specific parts of the low poly mesh.

> Name matching is very precise and will take into account uppercase and lowercase. Therefore a mesh named "**Mesh**" will not be the same as one named "**mesh**". Another example with an underscore "**_**" being different of a dash "**-**".

> The **matching by name** works only with **mesh** name. Any container, transform or other type of resource user to organize your scene before your export will be ignored in the bakers.

How to setup the bakers ?
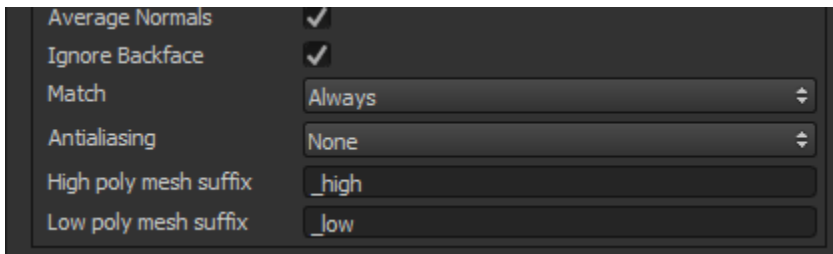
In Substance Painter the name matching is not enabled by default.
You can enable by setting the Match parameter to "By mesh name" instead of "Always".

Here you can also configure the suffix that will looked for during the matching. For example if you named you meshes like this :

- **head_lp** then write the suffix **_lp** instead of **_low**.
- **body_hp** then write the suffix **_hp** instead of **_high**.

> The Ambient occlusion baker also has a matching by name parameter because this baker sends a second set of rays.

High-poly meshes from zBrush

Since **zBrush 4R7** you can export as FBX which allow to skip this setup.

Because of the way Pixologic zBrush export meshes and name them, we made a special case in the bakers of Substance Painter to handle them.
Some things need to be configurated before those files will be able to work in Substance Painter with the matching by name.

Note however that zBrush **rename** the first subtool when you save your ztl file. So be sure to check your meshes names before exporting.

zBrush doesn't write the mesh names inside the OBJ. Therefore Substance painter will read the **filename** of the OBJ instead.
To be sure that Substance Painter recognize the OBJ as coming from zBrush, the "**group**" (Grp) parameter needs to be disabled in the export settings of **each** subtool before exporting to OBJ.
Once done, name the obj as the mesh that you want. For example : **body_high.obj**

Effects
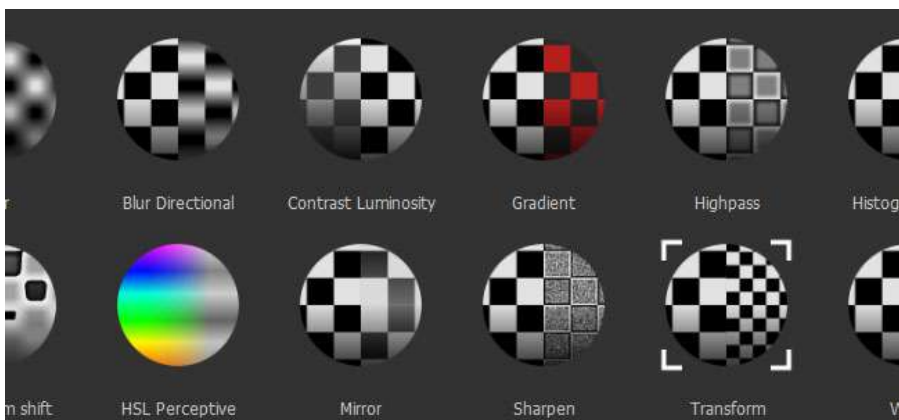
The Effects are a set of various **actions** that can be applied on **the content** or **the mask** of a **layer** in the layer stack of Substance Painter.
They allow an infinite series of changes from simple color variations to complex mask creations. Multiple Effect are shipped with Substance painter by default, but you can also create your own in Substance Designer.

Effects can be added to the stack through **a right click** on any layer or mask, or by clicking on the dedicated **button on top** of the layer stack window.
Most effects have a blending mode and opacity, like regular layers and can be reordered, allowing you to create a full stack of effects to create a complex mask for example.

> You can right-click on an effect to reorder it but also use the ALT+Up arrow or Down arrow to quickly reorder them.

These are the different types of Effects you will find in Substance Painter :

- Generator
- Paint
- Fill
- Levels
- Filter
- Anchor Point
- Creating custom effects

Generator

Generators are substances that generate a mask or a material based on the mesh topology using the additional maps setup in the TextureSet Settings.

Each generator has a set of parameters allowing you to fine-tune the resulting mask.
To add custom generators in the shelf, see : Adding content to the shelf

> When creating a new substance in Substance Designer, you can choose the Painter Generator **template** to get a good starting point to build your generator upon.

Paint

This effect allow to paint over other effects. It behaves like a layer which means you have access to the various blending mode and an opacity control.

Fill

Fill effects are the same as a Fill Layer but can be applied as an effect on a layer or a mask, allowing to build more complex materials or masks in a single layer.

Levels

The level is an effect used to adjust the color ranges of an image. It allows to balance and tone colors and/or graycales values. You can add it by opening the effect menu :
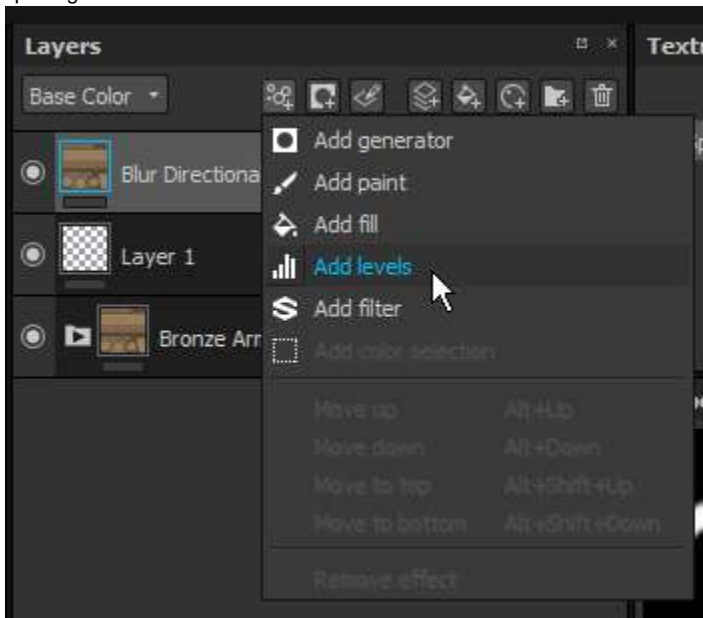
The main interface display a histogram (the mountain of colors in the middle of the interface) which is the representation of how pixels are distributed in an image at each color intensity level. The histogram shows details in the shadows (left part), midtones (middle part) and the highlights (right part). The histogram also give a quick look at the tonal range of the colors, allowing to determine how dark or bright the image is.
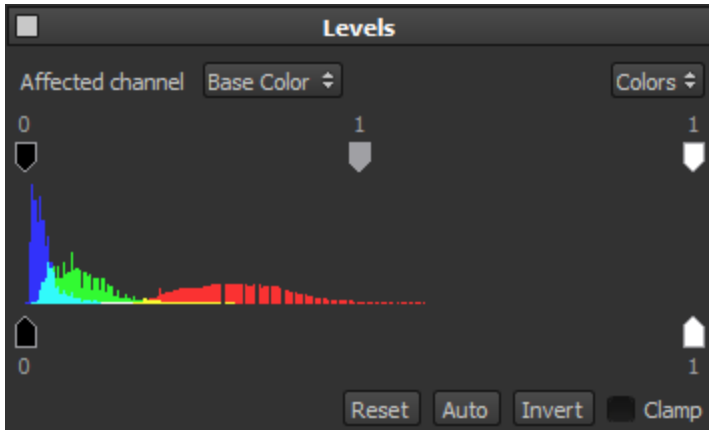
To adjust the color range of the image, two sets of controls are available at the top and the bottom of the histogram :

- The three top buttons control the shadows, midtones and highlights and can be used to redistribute the tonal range to contrast the overall image.
- The two bottom buttons control the black and white point of the image (usually 0 and 255). This can be useful to invert the colors of an image for example.

> The levels effect can only be applied to one Channel at a time, as selected by the *Affected Channel* option. If you want to apply a level on multiple channels, you'll have to create multiple Levels effects.

- The Colors drop down box on the top right allows you to change the levels on the full rgb image or on only one of the red, green and blue channels.
- The Clamp option at the bottom right allows you to clamp the values of the levels between 0 and 1 (0-255). This option should always be checked when working on non HDR channels (like the **Base Color**).

Filter

Filter Effects are substances that transforms the content of a layer or mask.

How to apply a filter ?

Depending of the filter type, a filter effect has to be created on the content or the mask of a layer.
In the following example a blur filter is applied on the content of a layer :

1 - Adding a filter effect

Start by selecting the content of a layer (left thumbnail) then click on the effect button (or right click to open the context menu).
Select the option "**add filter**" in the list.
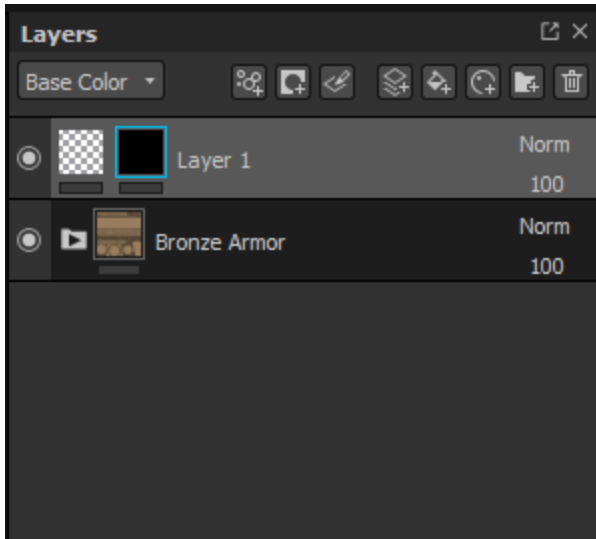
2 - Selecting the filter in the properties window

In the properties window, the parameters or the filter are currently empty. Only the selection button is available.
Click on the button to open the mini-shelf and select the desired filter, here we choose the blur filter.
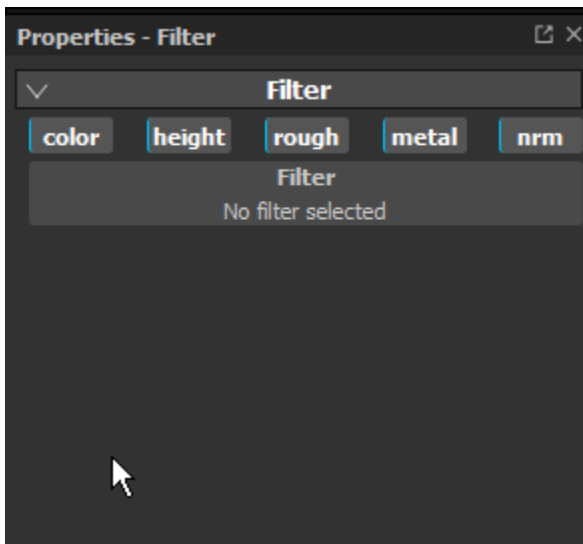
> To apply an effect on the whole layer stack instead of only the current layer :
>
> 1. Add an empty layer
> 2. Apply the effect on this layer
> 3. Set the layer blending mode to Pass-through for all the channels.
>
> It is also possible to simply drag and drop the filter into the layer stack. It will automatically create the layer with the right blending mode and the filter attached to it.

What type of filters are available ?

See the dedicated page below for information about each filter available in Substance Painter :

Adding new types of filters

All the filters are Substances, which can be created with Substance Designer.
As a quick startup, Substance Designer provide templates ready to use for Substance Painter.

For more information see this page : Creating custom effects

Anchor Point

An Anchor Point is a way to expose any resource or element in the layer stack and reference it in different areas of the layer stack for different purposes and with a different set of adjustments.
They open up a whole new set of possibilities, allowing you to effectively link layers or masks together and have a single Anchor point affect multiple aspects of your project, transforming Substance Painter into a truly non-linear experience.

> An anchor point can only be referenced inside the same texture is has been created. Creating links between an anchor and its reference(s) is not possible across Texture Sets.

Add an Anchor Point

Anchor Point are available in the Effects menu. They can be added on both layers and masks.
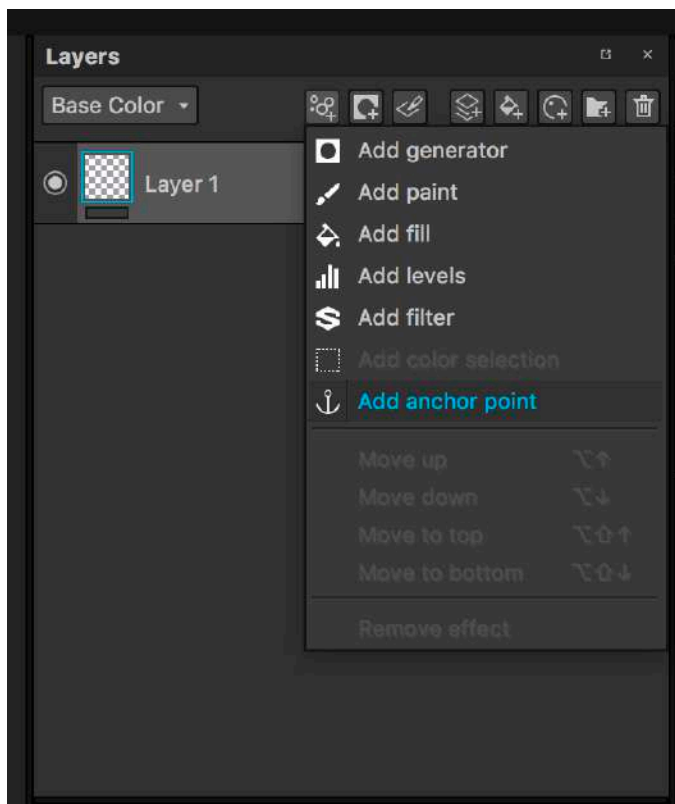
Use an Anchor Point as a Reference

An Anchor Point can be referenced by another layer: this will instantiate the content of the anchor point into the layer referencing it.

Anchor Points can be used as a reference in the following resources:

- Fill Layer
- Fill Effect
- Input of a substance filter (Effect, Procedural, Generator)
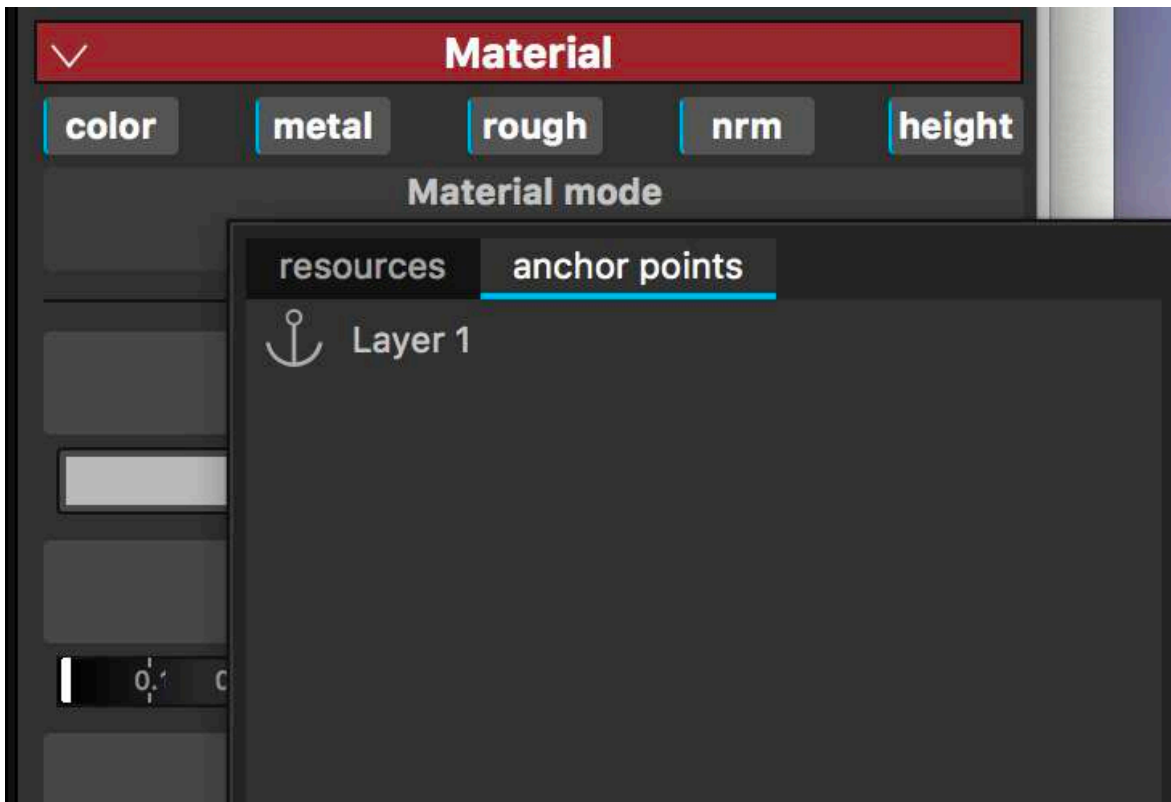
Only Anchor Points which are **below** the layer referencing it can be used as references.
If you move an anchor point above a layer referencing it, it will break the reference. You can undo if you want to cancel this action.
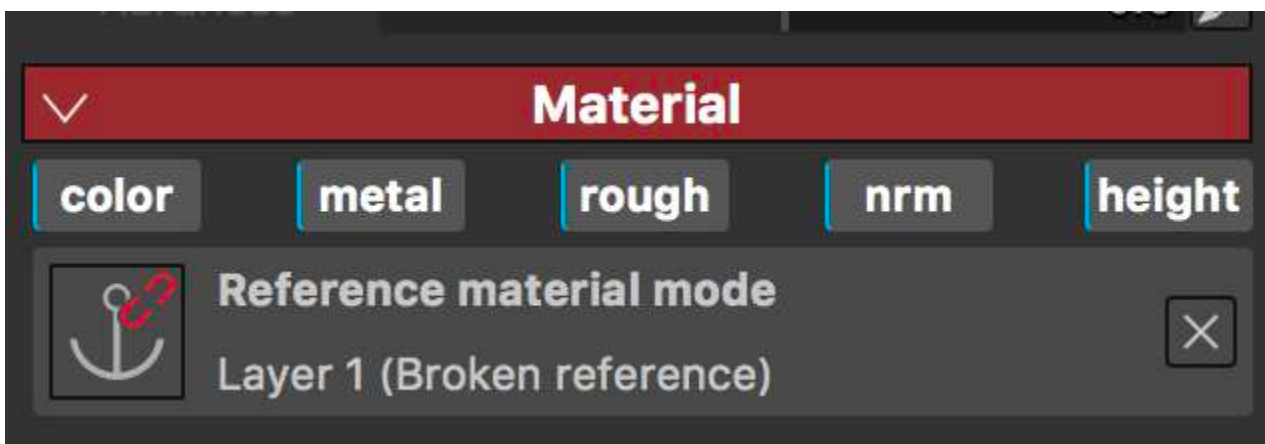
Find References for an Anchor Point

When you click on an anchor point you can see in the properties the list of layers where this anchor point is used as a reference.
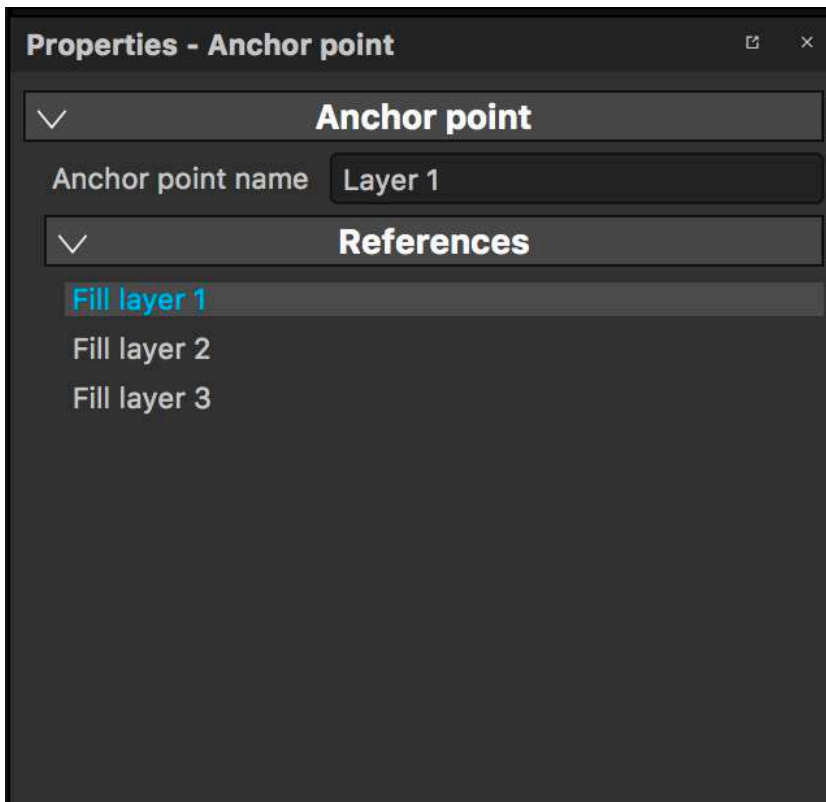
Find an Anchor Point

When you are a Fill layer / effect using an Anchor Point as a reference, you can jump to the anchor point.
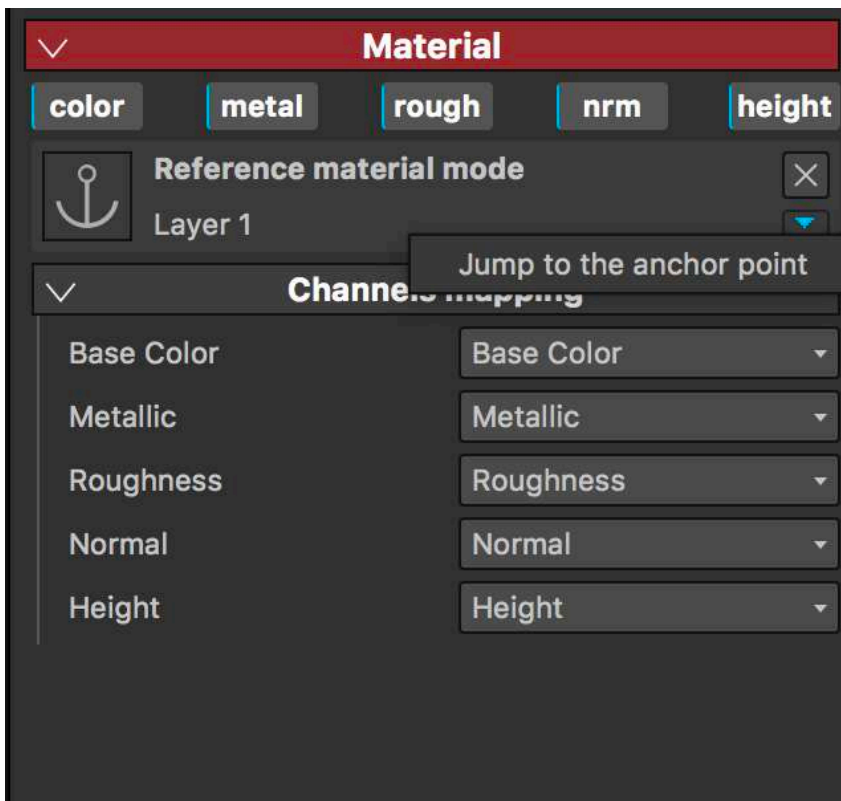
Creating custom effects

Substance effects must be built in a specific way in **Substance Designer** to work correctly once imported in Substance Painter.

> Custom effects can be imported in a project of the default shelf, see : Adding content to the shelf

See the following pages for creating custom effects in details :

- Generic filter
- Channel specific filter
- Generators
- Additional Map
- User data

Generic filter

A generic effect will be applied on all the document channels, including opacity. A generic filter can be :

- **grayscale**, it will be applied to each component (R, G, B and A) of each channel (basecolor, metallic, roughness and so on)
- **color**, it will be applied on colored channel as-is, or converted to grayscale internally to affect grayscale channels

The input node of the effect must have the **identifier** or **usage** defined **input** and its output node must have **output**. Note that **color** based fitlers can't be used on the mask of a layer, only **grayscale** fitlers will be compatible.

> It is possible to use either the **usage** or the **identifier** in an input node (the usage has the priority).

Example :
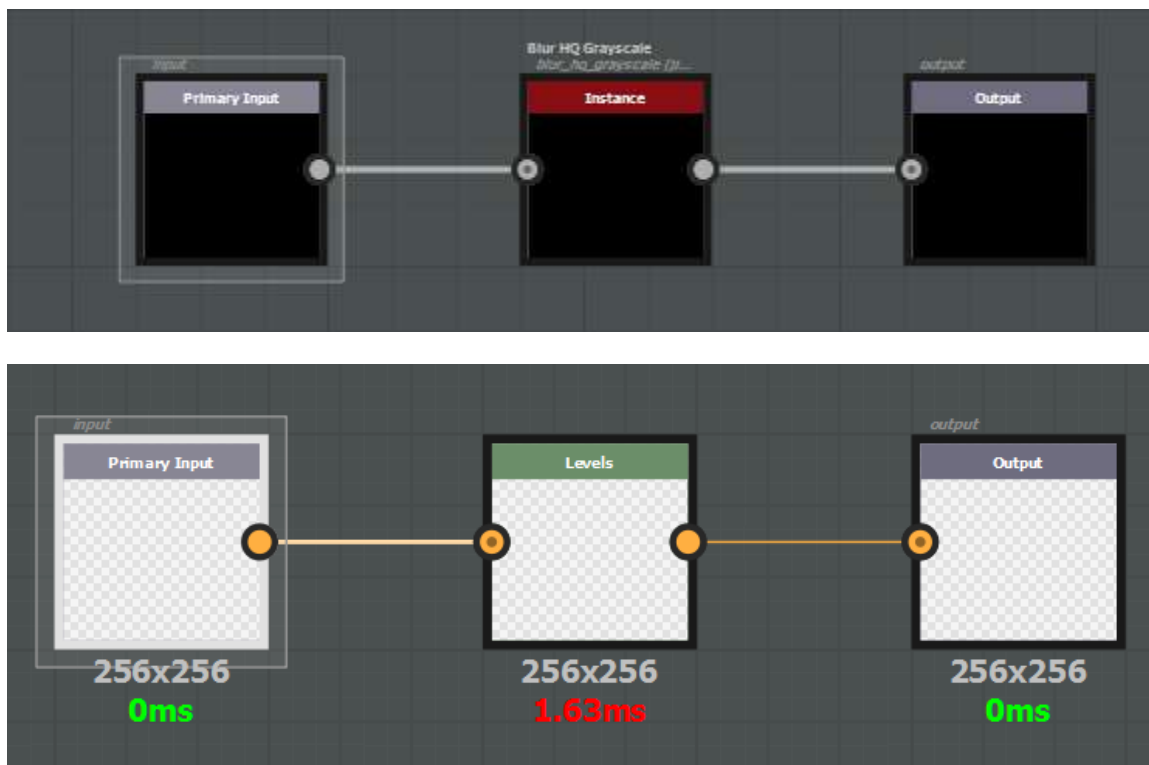
Channel specific filter

An effect can be specific to a particular channel. In that case, if you want to affect a specific channel, you need to create an input AND an output which identifies this channel. As a general rule, the input / output structure should always respect a 1:1 rule. If you want to input a specific channel, you have to output the same channel.

Example of a filter affecting the **basecolor** channel only :
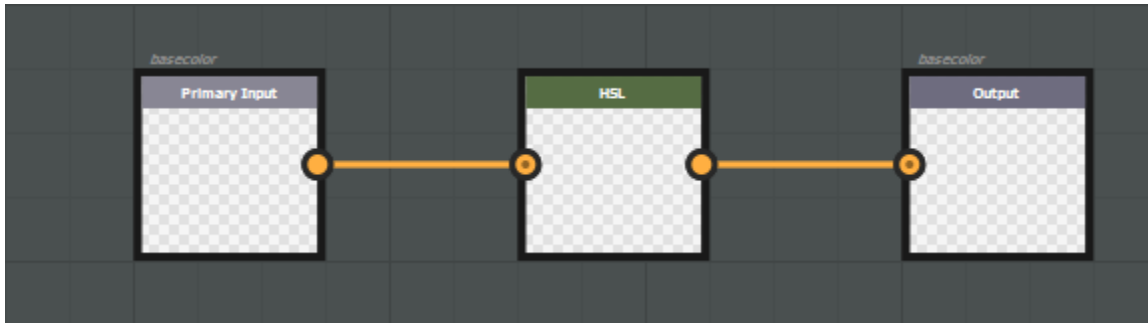
> It is not possible to combine generic setup (input/output nodes) and specific channels (basecolor/basecolor).

Alpha component management

Channels stored as RGBA support alpha (basecolor for instance). For these channel, the alpha Input/Output can be stored directly in the Substance color output. However, the Substance engine does not support Alpha for grayscale images: it has to be managed using a secondary map. To get the alpha component of a specific channel in a substance graph, create a grayscale input named '**channelname_Alpha**', example: **b asecolor_Alpha**, **roughness_Alpha** and so on.
To output this alpha component, create an output node with the same name convention.

> The specific "**_Alpha**" output per channel doesn't work with regular **materials**. To hide a channel with a mask, a specific output must be created with the following naming convention :
>
> * Identifier : **channels_Alpha**
> * Usage : **channels_Alpha**

List of input/output usages and identifiers

> It is possible to use either the **usage** or the **identifier** in an input node (the usage has the priority).

Channel name	Usage	Identifier / Identifier Alpha
Base Color	**basecolor**	**basecolor / basecolor_Alpha**
Diffuse	**diffuse**	**diffuse / diffuse_Alpha**
Specular	**specular**	**specular / specular_Alpha**
Specular Level	**specularlevel**	**specularlevel / specularlevel_Alpha**
Metallic	**metallic**	**metallic / metallic_Alpha**
Roughness	**roughness**	**roughness / roughness_Alpha**
Glossiness	**glossiness**	**glossiness / glossiness_Alpha**
Normal	**normal**	**normal / normal_Alpha**
Height	**height**	**height / height_Alpha**
Ambient Occlusion	**ambientOcclusion**	**ambientOcclusion / ambientOcclusion_Alpha**
IOR	**ior**	**ior / ior_Alpha**
Reflection	**reflection**	**reflection / reflection_Alpha**
Transmissive	**transmissive**	**transmissive / transmissive_Alpha**
Anisotropy Level	**anisotropylevel**	**anisotropylevel / anisotropylevel_Alpha**

Anisotropy Angle	anisotropyangle	anisotropyangle / anisotropyangle_Alpha
User 0	user0	user0 / user0_Alpha
User 1	user1	user1 / user1_Alpha
User 2	user2	user2 / user2_Alpha
User 3	user3	user3 / user3_Alpha
User 4	user4	user4 / user4_Alpha
User 5	user5	user5 / user5_Alpha
User 6	user6	user6 / user6_Alpha
User 7	user7	user7 / user7_Alpha

Examples
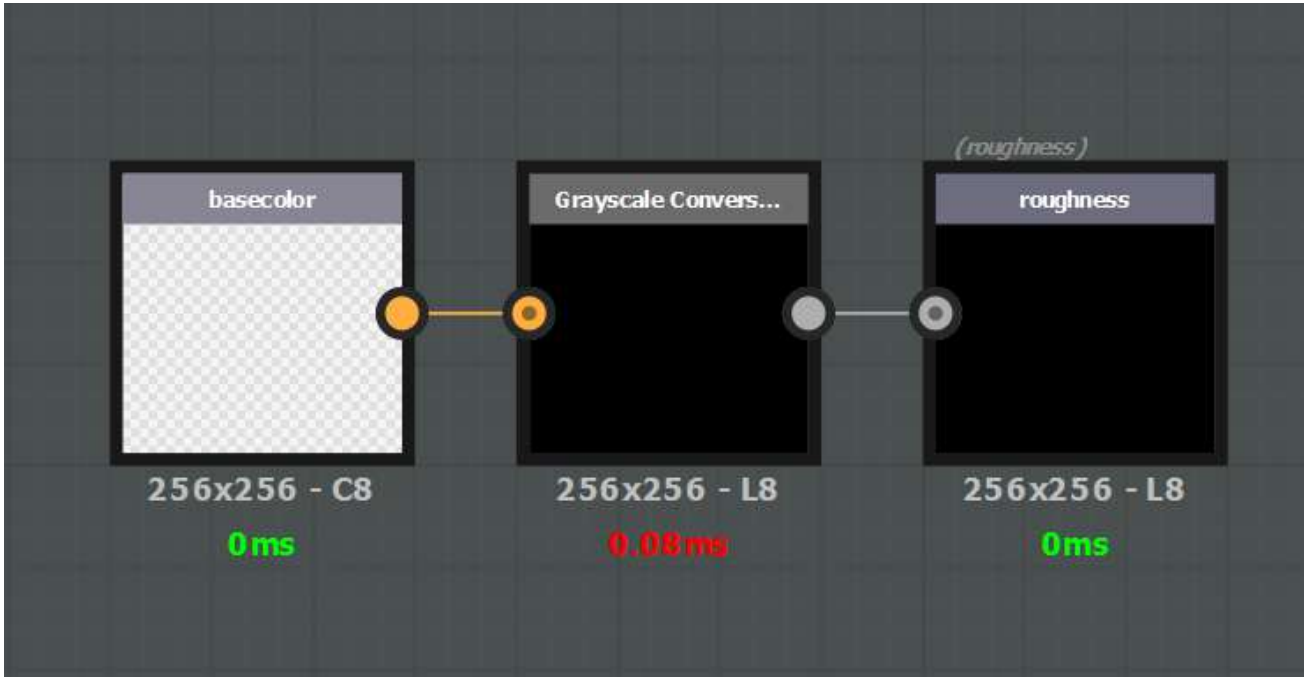
In this example the **Base Color** alpha channel is extracted via a grayscale node to overwrite the **Roughness** channel.
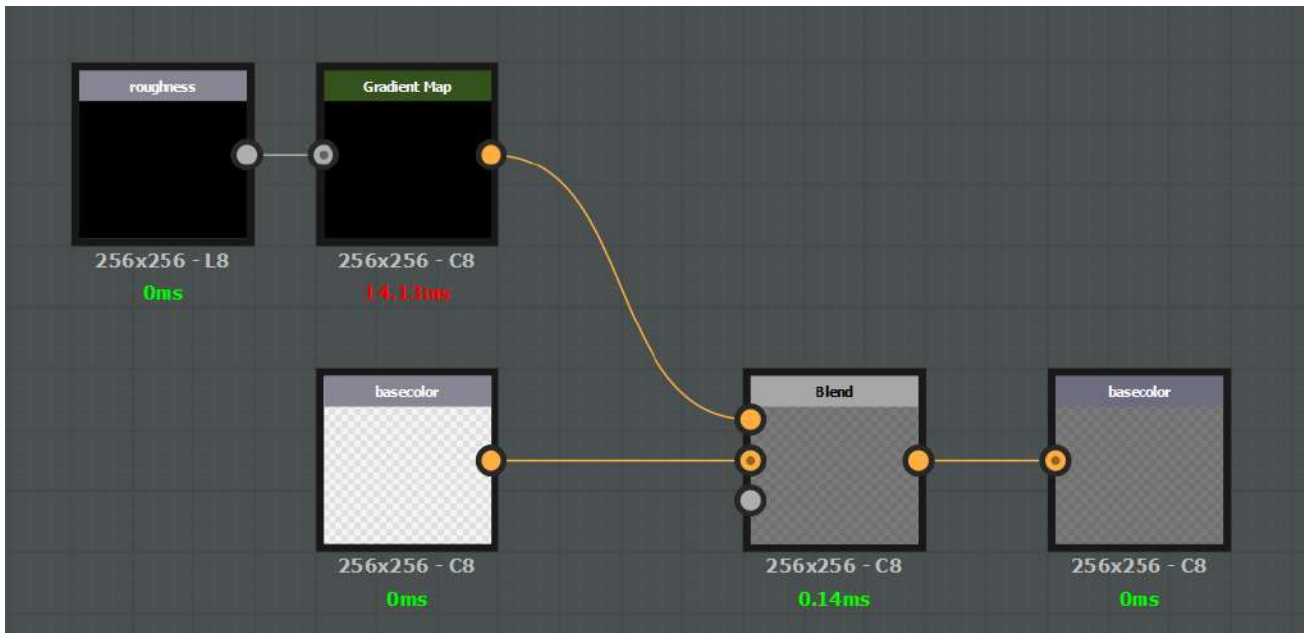
In this example the **Roughness** channel is multiplied over the **Base Color**.

Generators

A generator behave like a filter, the difference is that there is no input node other than the additional maps. If you need to read a channel from the texture set, then you want to make a filter.
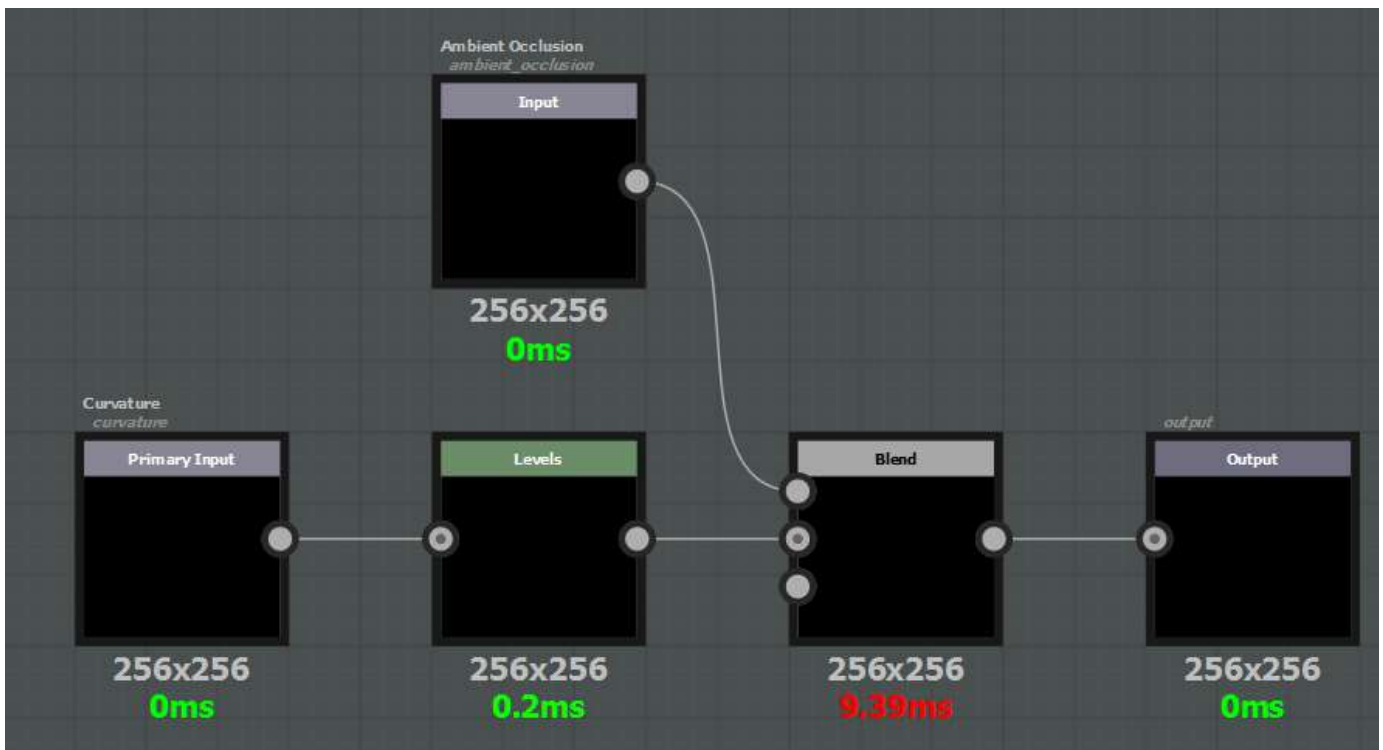
Additional Map

To automatically connect additional maps when an effect is added on a layer, a specific naming convention must be followed.

It is possible to use either the **usage** or the **identifier** in an input node (the usage has the priority).

Here is the naming convention for each additional map :

Additional map	Usage	Identifier
Ambient occlusion	**ambientOcclusionBase**	**ambient_occlusion**
ID	**id**	**id**
Curvature	**curvature**	**curvature**
Normal	**normalBase**	**normal_base**
World space normals	**normalWS**	**world_space_normals**
Position	**position**	**position**
Thickness	**thickness**	**thickness**

User data

The user data field in a substance is a place were you can put any type of information that you can find useful and will be preserved after the cooking of the substance. Substance Painter is able to read some specific user data in order to execute specific behaviors. Multiple information are separated by a semicolon (**;**).

Color space and Alpha type

Substance Input/Output color space is deduced from channel type: Base color, Emissive and Specular are considered as **sRGB**, Height and Displacement are considered as **signed**(-1..1), other channels are considered as **Linear/Pass-through**.
Substance Input/Output alpha component (RGB**A**) and the opacity channel is considered as **Straight** (not Premultiplied) by default. In order to override the default color space and/or alpha type, set the Input and Ouput **"User Data"** fields with specific keys.

The field is parsed as a list of pair *key=value* separated by semicolons.
The keys recognized by Substance Painter are :

- **ColorSpace**: I/O color space. Possible values are:
  - sRGB
  - Linear
  - Passthru (equivalent to Linear)
  - SNorm (-1...1)
  - NormalXYZLeft (DirectX Normal map)
  - NormalXYZRight (OpenGL Normal map)

- **Alpha**: I/O alpha or opacity channel interpretation. Possible values are:
  - Straight (default)
  - Premultiplied
  - None (passthrough)

The **Alpha** key must be always set on main channel, not on corresponding channel opacity if any.

Example :
ColorSpace=sRGB;*Alpha*=Premultiplied
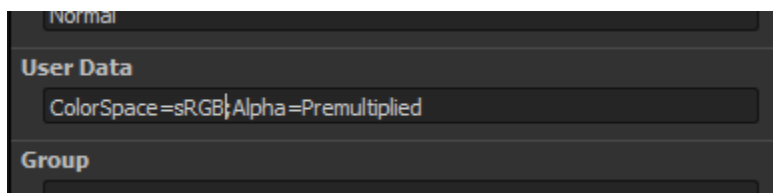
Input default color

The default color of an image input is black with its alpha set to 0. You can however override this default color. Use the parameter "defaultcolor" for that purpose. You can either use value between 0.0 and 1.0 or 0 and 255. If Substance Painter detects no '**.**' (point) in the number we consider that the number is an int instead of a float.

Example :
defaultcolor=(1.0,0.5,0.0)
defaultcolor=(0,128,255)

Input padded

By default the input of a substance will receive a texture with an uniform color filled outside of the UVs for performance reasons. However it is possible to request Substance Painter to provide an input that has padding/dilation instead outside the UV islands. This is very useful for example for filters such as Sharpen or Blur.

Example :
Padding=Extend

Disable an output by default

When adding a substance into a slot (like the material slot of the tool of a fill layer), it is possible to specify via the metadata text field to not enable a specific channel :

- On a specific output node (like a material) : **disable=(true)**
- On a generic output node (like a filter) : **disable=(height,diffuse,specular)**

When loading the substance, this channel will not be enabled in the user interface and therefore will have no effect in the layer stack. The user can still enabled back the channel.

Smart Materials and Masks

Substance Painter supports the use of advanced **layer presets**. These presets can be used to quickly **share across** Texture Sets or Projects a **similar texturing process** while keeping the results different, **adapted to the mesh topology**.

> Note that once added in the layer stack, there is no way to retrieve which smart material was used. In the case a smart material need to updated, the process will have to be done manually.
> However individual resources can be updated with the Resources Updater.

How to use Smart Materials/Masks ?

Smart Materials can be used anywhere in the layer stack, while smart masks can only be used in the effect stack.
To know more about the differences, see : Layer stack and Effects

Adding a Smart Material

Smart Materials can be added in two different ways :

- By drag and dropping a smart materials from the shelf into the layer stack :
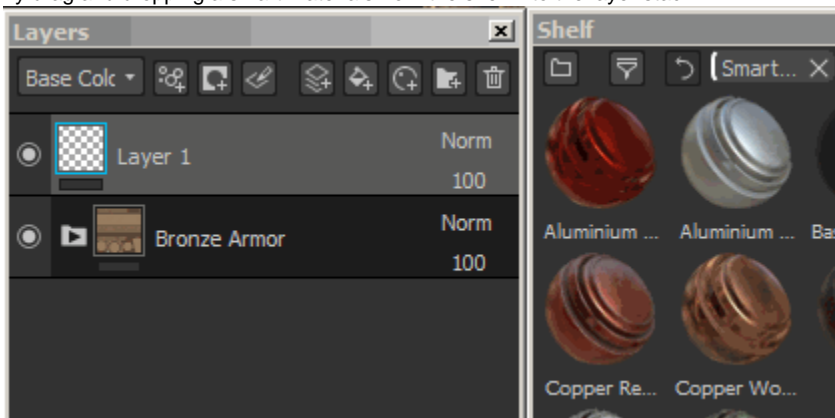
- By clicking on the Smart Material button to open a mini-shelf :
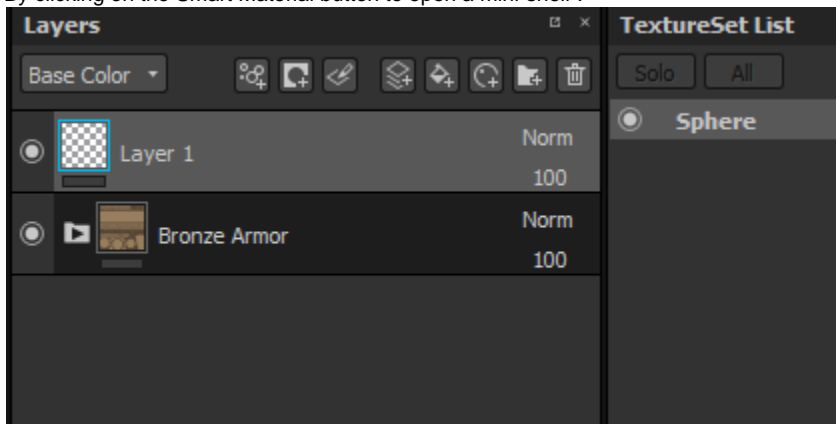
Adding a Smart Mask

Because Smart Masks are presets of effects, they can therefor only be added to effect stacks (for mask specifically).

- To add a Smart Masks, simply **drag and drop** one from the Shelf onto the **target** layer :
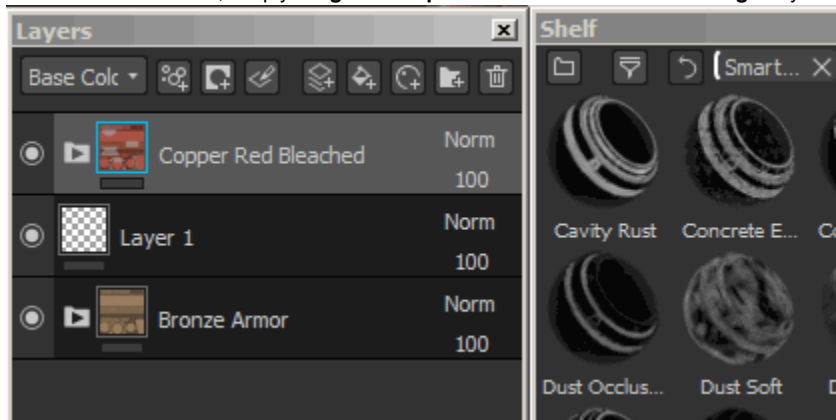
- Drag and dropping **multiple** Smart Masks will accumulate them :
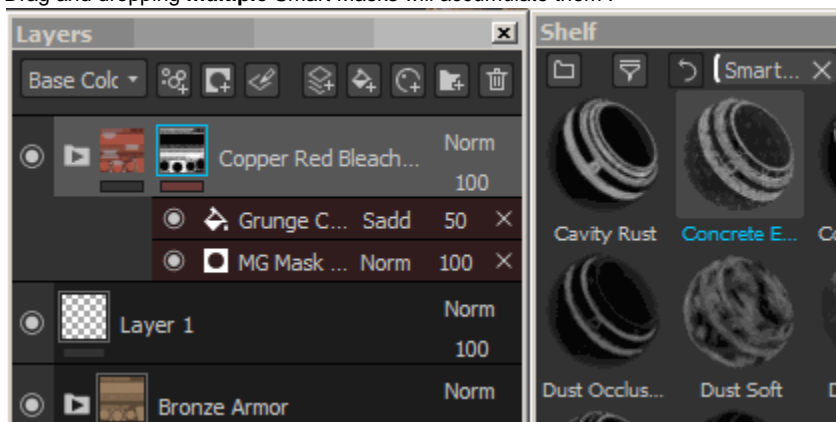
- It is possible however to **replace** the whole effect stack by pressing **CTRL** during the drag and drop :
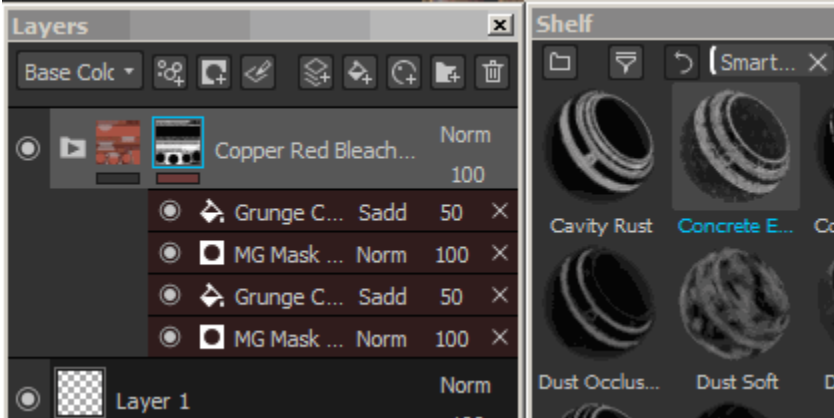
How to create Smart Materials/Masks ?

To create a Smart Materials, a **folder** is required.
The content of the Smart Materials will be contained in the folder. Then simply right-click on the folder and select "**Create smart material**". The Smart Material will then be added to the current shelf and will be named accoridng to the folder selected.
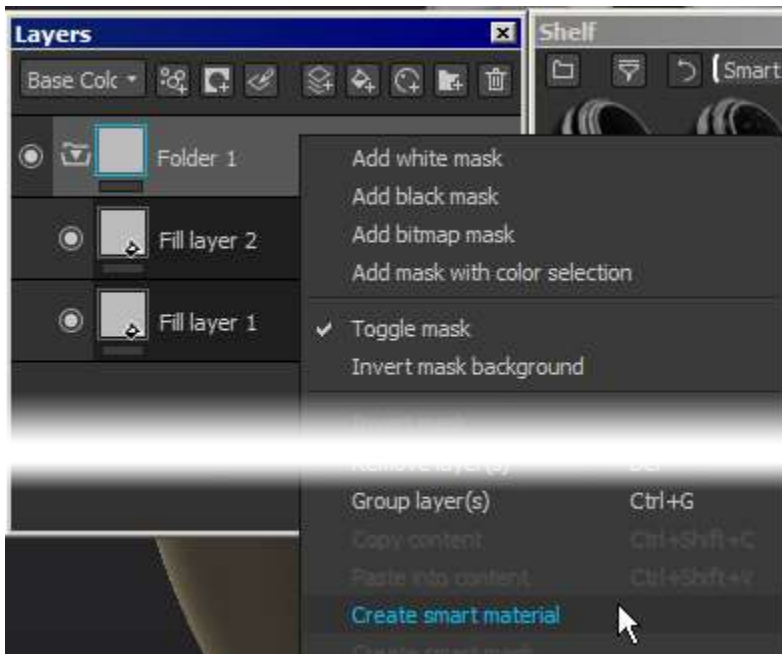
To create a Smart Mask, simply right-click over a layer and choose "**Create smart mask**".
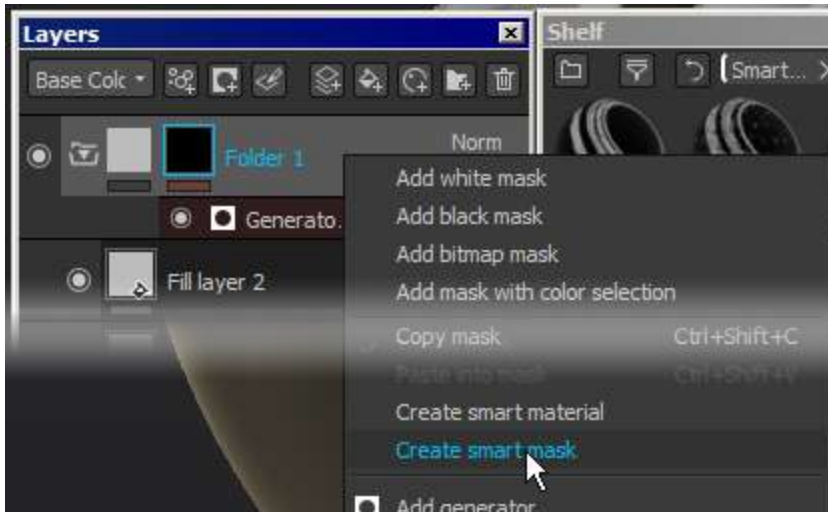
How to share/retrieve a smart material/mask ?

The presets are saved **on the disk** and can be retrieved from their dedicated folder.
To find the **shelf location**, see : Adding content on the hard drive.

Then anybody can simply **import** the file into their Substance Painter shelf to use the preset.

UV Reprojection

UV Reprojection is an automatic process that happens when you changed the texture resolution or that you import a new mesh.
If you load a new mesh in your document (via the Project configuration window), all your actions will be reprojected on that new mesh. It doesn't matter if the topology changed (as long it's similar) or that the UVs have changed. Since the reprojection works by recomputing all the layers and brush strokes, it can take a bit of time (especially at high texture resolutions).

Painting in 2D View

Since every stroke made in the 2D view is performed in the UV space, there is no way to reproject it properly in case the UV of the mesh change dramatically after a reimport. The best way to make your project reprojection proof is to rely on masking by an ID map and other type of selection and painting instead the 3D View.

How does the re-projection work ?

Substance painter saves its data in 3D in world space to keep everything non destructive. That means that when reimporting a mesh, Substance Painter tries to paint where the mesh was before the reimport, it has no way to know where some pieces could have moved.

Also when Substance Painter import a mesh, it computes it's bounding box to register the space and define a relative scale for the tools (paint brush, particles and so on). This Bounding Box is 1 unit wide on every axis. When you import a new mesh, if you uncheck the "preserve stroke" we re-normalize the bounding box to the new mesh. Therefore if your mesh changed dramatically in size, the strokes can move. If you check "preserve strokes" however, we scale the original bounding box to the new one in order to reproject properly the brush strokes.

UDIM

What are UDIMs ?

UDIM was invented by Richard Addison-Wood and came from Weta Digital (circa 2002). The term UDIM comes from **U-Dimension** and design **U V ranges**. The UV range 0-1 being 1001, the range 1-2 being 1002, and so on. We designate by **UDIM Tile** a specific range, the tile 1001 being the range 0-1 of a given mesh. The goal of having multiple UV ranges it to **increase the texture resolution** of a given mesh. Instead or working with very big textures (16K, or even 32K) which are hard to optimize it is instead better to split a mesh into sub-parts. Because of the UDIM naming convention, parsing files is easy as the ID of a tile is embedded into the filename, which make them convenient to use in external rendering software such as **Vray** or **Arnold**.

For further information we recommend reading the UDIM article made by FX-Guide.

How do UDIMs work ?

To make this feature work any mesh need to :

- be unwrapped (need of UV coordinates)
- have any UV islands inside a tile (UVs can't cross over multiple tiles)
- have UVs that don't go over 10 on the U axis (no limit on the V axis however, unless you reach the limit of the naming convention)
- have UVs that don't go below 0 (negative range are not supported)

Computing the UDIM ID of an uv island is quite easy with this formula : UDIM = 1000 + (U coordinate + 1) + (V coordinate) * 10
Example : **U=0**, **Y=0** which is the range (0,1) = 1000 + (**0**+1) + (**0***10) = **1001**

Creating UDIM

Creating UDIMs is no more complicated than creating a regular mesh. When unwrapping a mesh, instead of being limited to the UV 0 - 1 range it is now possible to shift them away to an other range (as the example below).
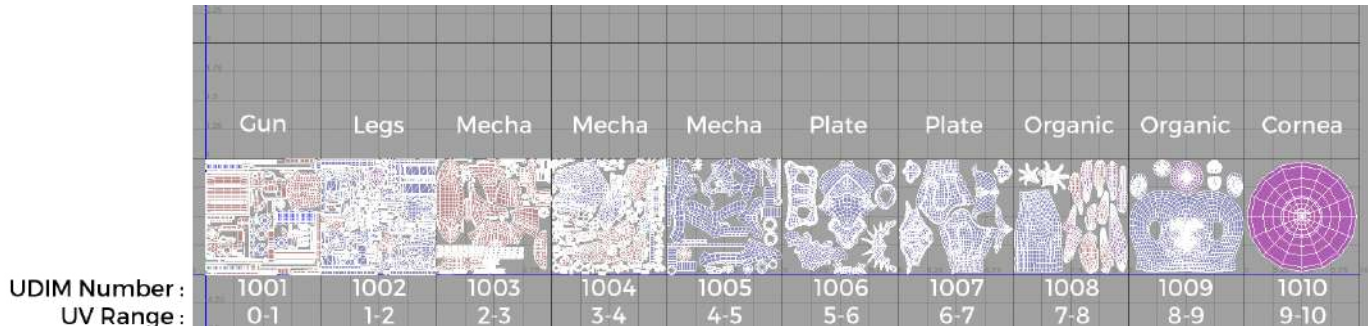
How do UDIMs work in Substance Painter ?

When importing a mesh, it is possible to enable a specific setting named "**Create a texture set per UDIM tile**". If enabled, the materials defined on a mesh will be ignored and instead Substance Painter will create a texture set per UDIM tile found. If there is an error (like an UV island crossing multiple tiles), the import will be cancelled and an error with details will be printed in the log. Since Materials names are discarded, the texture set will be renamed according to they UDIM tile to be exported properly after.

> At the moment Substance Painter has a limited support for UDIMs tile. A full support that will allow to paint across multiple UDIMs is currently in development.
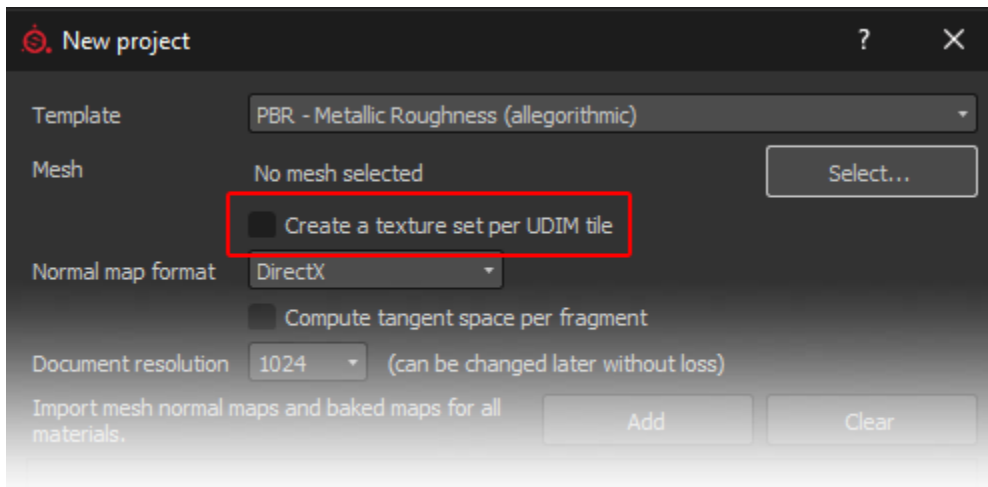
Are UDIM compatible with game engines ?

Yes and No. They are not usable directly, but by tweaking some shaders inside an engine it should be possible to load multiple UDIM textures over one object. This is however expensive and game engine require more optimizations to be able to run many textures in real-time. Therefore using UDIMs for real-time rendering is not recommended for the moment.

How to import UDIM in an offline renderer ?

We have a few tutorials accessible that cover specific renderers :

Color Management

Substance Painter offer various tool to manipulate the color and images displayed in the viewports :

* Color Profile

Color Profile
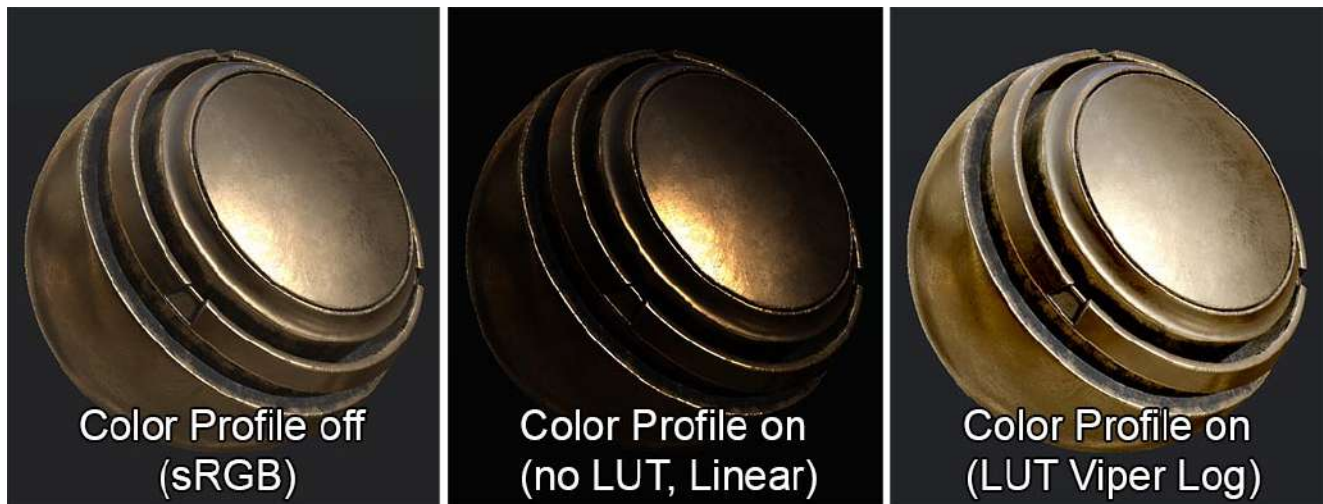
Substance Painter allow to assign **Color Profiles** to the **viewports** by loading **LUT** textures.
A color profile can be used to calibrate the final color of the screen to match a target, such as a specific camera. Often a profile will manipulate colors by changing the brightness, the gamma, the contrast or even the color balance.

> **LUT** stands for "**Look Up Table**". It is an optimized way of performing color grading as a post effect. A LUT is used to make up the difference between a source and a result.
> Substance Painter use **3D** LUTs stored as **2D texture** (Floating) of any possible resolution (default are **2048x128 pixels**). This means the cube storing the color operations is separated in slices which are displayed side by side. For more technical details, see the **GPU Gem** article : http://http.developer.nvidia.com/GPUGems2/gpugems2_chapter24.html

Using Color Profile

A Color Profile can be loaded via the Display Settings window.
Check the "**Activate Color Profile**" checkbox to affect the viewport and enable a Color Profile.
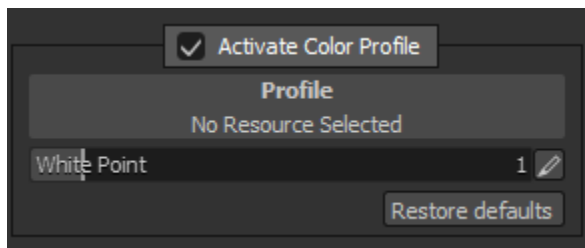
* When "Activate Color Profile" is **disabled** the rendering of the viewport is done in **sRGB** for the Material view (and Linear for some specific channels)
* When "Activate Color Profile" is **enabled** the rendering of the viewport is done in **Linear/Raw** for every view (including solo channels)

If a LUT texture is loaded in the ressource slot, then it will be used to manipulate the rendering of the viewport when in **Material mode**. Otherwise the rendering will be displayed as Linear/Raw (for example with solo channels views).

The **white point** setting can be used to change the tone mapping of the input image (before the LUT take effect).
If you are looking at the sun for example, the value should be higher than 1 (default). For a perfect exposure, the white point must be set to the high value of the image.

> It is possible to apply a specific tone-mapping before using a the Color Profile. See the functions available in the Post-Processing system.

Creating Color Profiles

Substance Painter will shift the viewport to **Linear** rendering when the "**Activate Color Profile**" is enabled. This means that when a LUT is applied, it needs to translate color from a Linear profile to the desired target.

Method 1 : Modifying the Identity LUT

Editing the identity LUT can be done in a software supporting **32bits floating** textures, such as **Substance Designer**.
Download the attached identity LUT as a start point to make a new profile : linear_to_linear.exr

Method 2 : Using OpenColor IO to generate a LUT Texture

Install the **OpenColor IO** tools. Then download the Sample OCIO Configuration, available here : http://opencolorio.org/downloads.html
From there, run the **ociolutimage** program with the following arguments :

```
ociolutimage --generate --cubesize 64 --config nuke-default/config.ocio --
colorconvert linear srgb --output lutLinearToSRGB.exr
```

Note : It is also possible to modify the Identity LUT with **OpenColor IO** by using the **ocioconvert** program to apply color conversion to this lut.

Importing a new Color Profile in the Shelf/Project

Simply open the import window (or drag and drop the LUT into the shelf). When importing the LUT texture in Substance Painter, be sure to assign the "**colorlut**" **usage** to the new ressource. Otherwise the ressource won't be visible properly in the shelf.

For more information, see the documentation about the import of new ressources : Adding content via the import window

Advanced channels painting

Substance Painter supports channels used in shaders that can be painted to created advanced or complex effects.
For example : **flow maps** or **normal maps**.

Advanced channels available :

- Ambient Occlusion Painting
- Flow Map Painting
- Height Map Painting
- Normal Map Painting

Ambient Occlusion Painting

> **From : https://en.wikipedia.org/wiki/Ambient_occlusion**
>
> In computer graphics, ambient occlusion is a shading and rendering technique used to calculate how exposed each point in a scene is to ambient lighting. The interior of a tube is typically more occluded (and hence darker) than the exposed outer surfaces, and the deeper you go inside the tube, the more occluded (and darker) the lighting becomes. Ambient occlusion can be seen as an accessibility value that is calculated for each surface point.

In the case of Substance Painter, the **result** of this computation is then stored in a bitmap named the "Ambient Occlusion" map. This map can be baked in Substance Painter directly : Ambient Occlusion

The ambient occlusion channel allow to paint details in the ambient shadows of an object. It can be used to add AO details coming from Materials, or simply fix manually baking errors when needed.

Painting Ambient Occlusion

To paint AO details, an Ambient Occlusion channel is required. It can be added via the texture set settings :
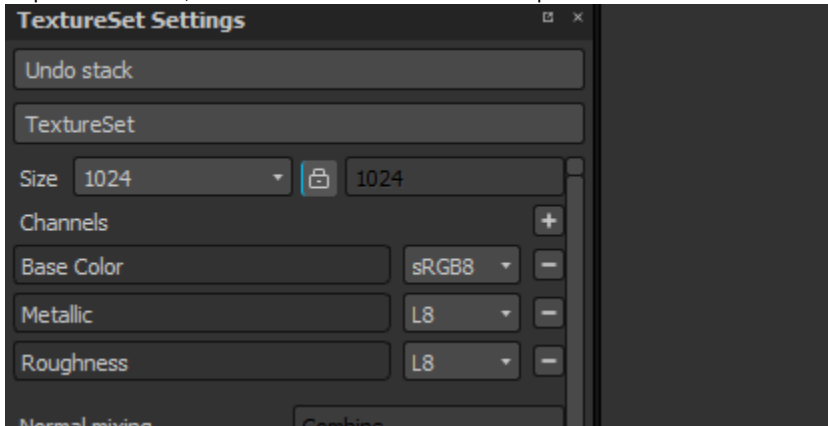
On the channel has been added to a texture, any layer can be used to paint new information. Since the AO channel contains only grayscale information, any blending mode can be used to combine details. Most common blending mode will be "**Normal**" and "**Multiply**".
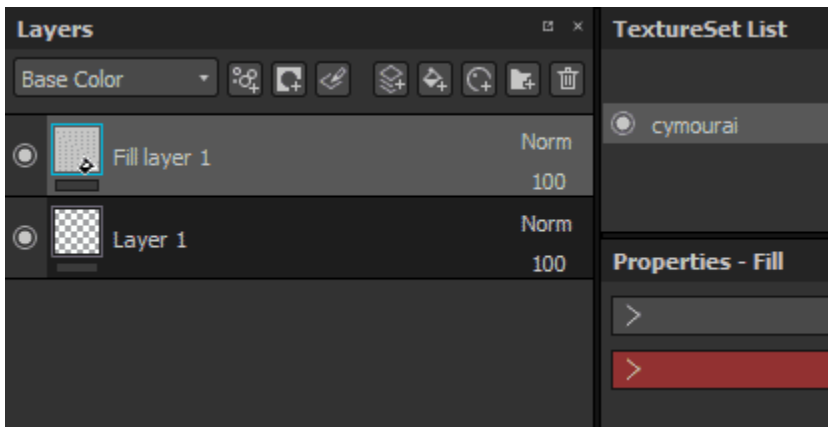
Painting over the Ambient Occlusion additional map

In some situation, it can be useful to paint over the baked Ambient Occlusion in order to hide details or even fix baking issues.

The default setup of a project in Substance Painter will combine the Ambient Occlusion **channel** with the Ambient Occlusion map from the **additional maps**. This means that painting over the baked additional map is not possible by default, the results of each maps (the baked maps and the channels) will be multiplied together. This can be changed however with the following setup :

1 - Add an Ambient Occlusion channel

Add an ambient occlusion channel in the current texture set :
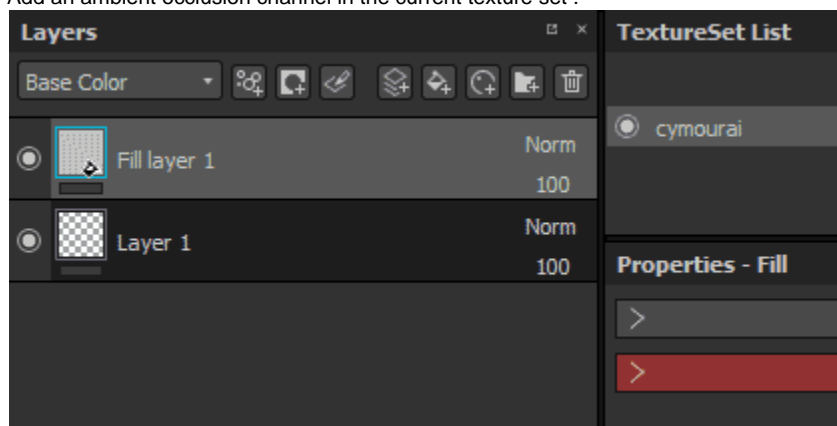
Set its mixing mode to "**replace**" instead of "**multiply**" :
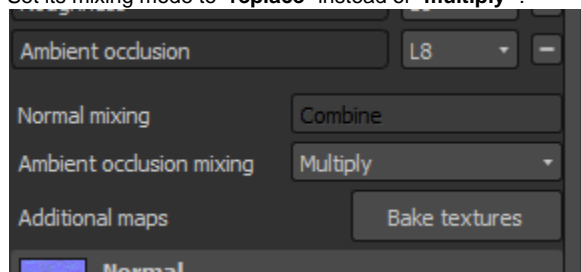
2 - Setting a fill layer with the baked normal map

Create a new fill layer and put the baked ambient occlusion inside the "ambient occlusion" slot, via the properties panel. Don't forget to change the default tilling of the fill layer if it not already set to 1.
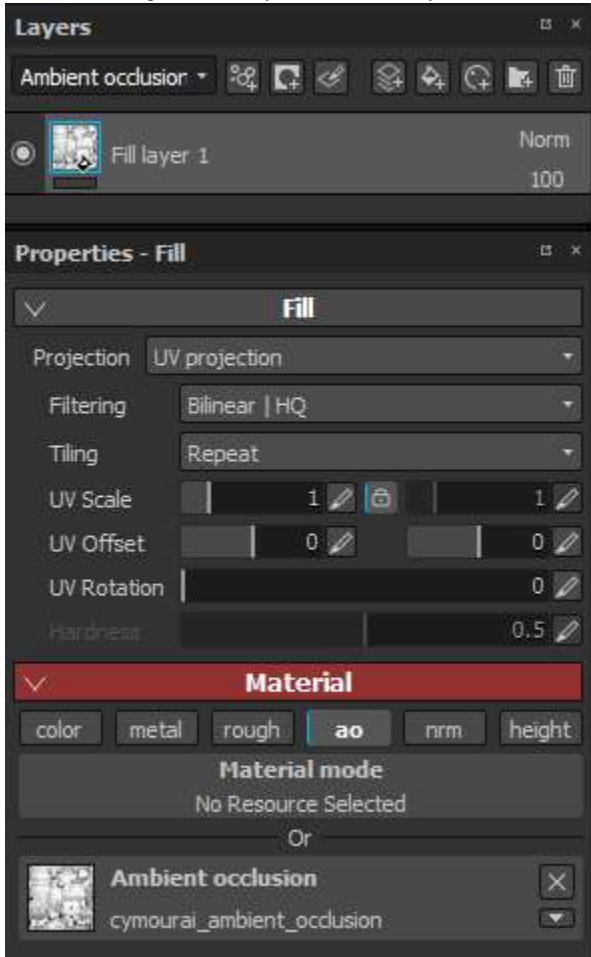
3 - Changing the fill layer blending mode

By default the blending mode of the AO channel on any new layer is set to "**Multiply**". Since it is preferable to use the fill layer as the base, we chose the "normal" blending mode since the bitmap don't have any alpha, it will replace everything below (including the default color of the shader).
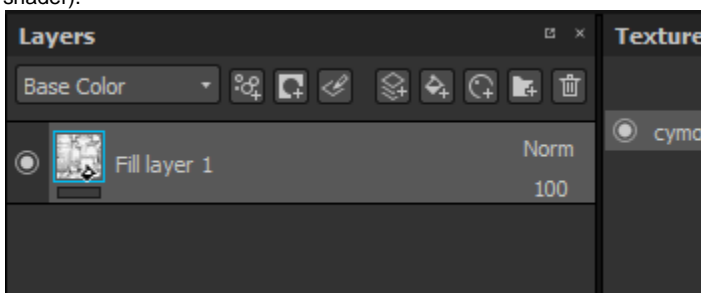
4 - Creating a layer to paint over the baked ambient occlusion map

Create a new layer (regular or fill) and change its blending mode to "normal" for the AO channel. Once this setup is done, anything painted on the AO channel will take over the baked AO map that is on the layer below.

Flow Map Painting

A dedicated channel is planned, but meanwhile by using the Normal channel and some brush parameter it is possible to paint flow maps in Substance Painter.

Step 1 : Create the normal map

Create a normal map texture of 16 by 16 pixels. The color has to be 128, 255, 128 which should give the following color :
(This color is the equivalent of a vector looking up, in DirectX)

Step 2 : Add normal channel

In your Substance Painter project, add a **Normal** channel via the **texture set settings** if this channel doesn't already exist.

Step 3 : Setup of the brush

Enable the follow path feature in the brush parameters. Load the normal map texture (step 1) into the normal channel slot. Disable the other channels.
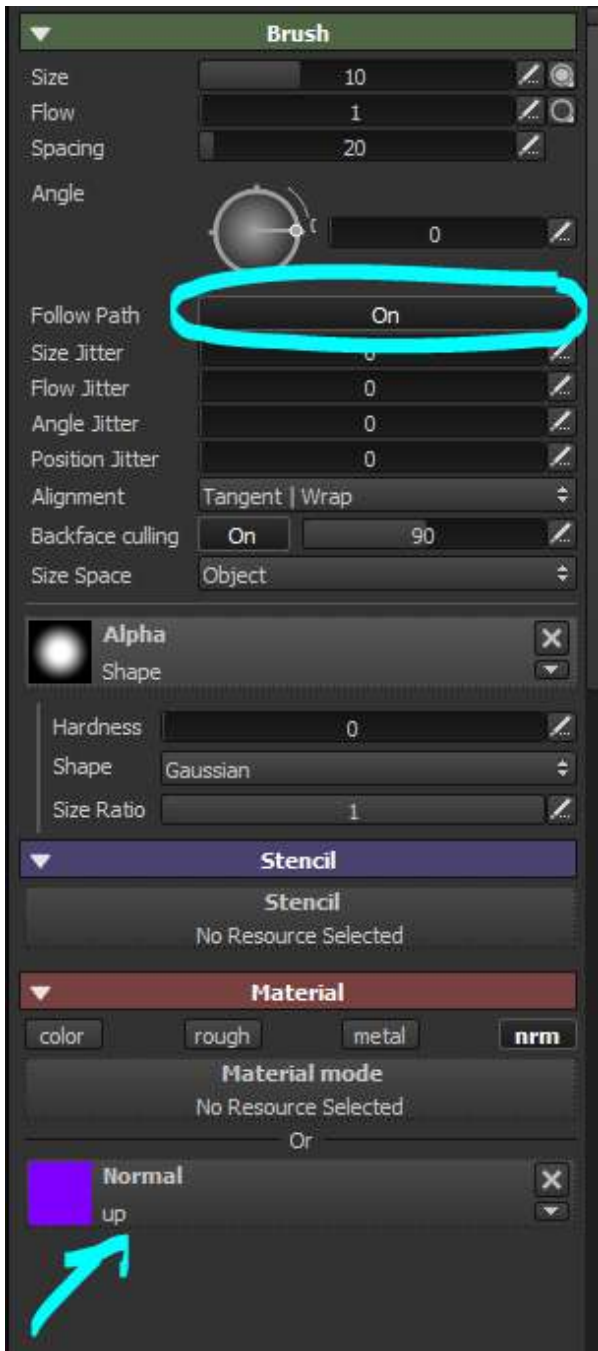
Step 4 : Paint !

By painting on the mesh with the follow path setting enabled, the brush strokes will draw directions into the normal map.
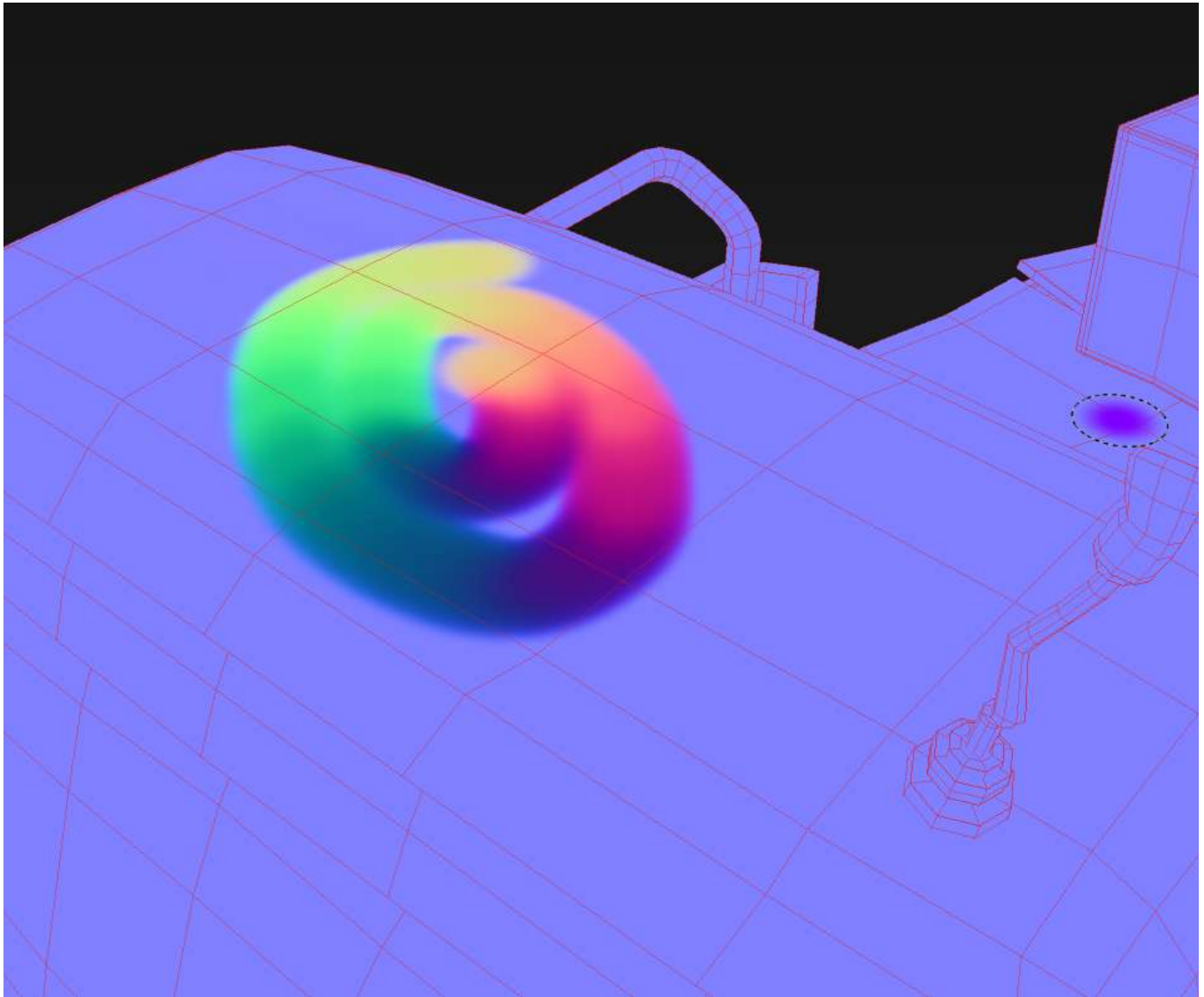
Height Map Painting

General Idea

Working on a heightmap instead of directly on a normal offers multiple advantages such as better quality, better control, flexibility and better consistency between assets.

The process goes as follows:

- A normal map, baked from a high poly mesh, is loaded on the low poly mesh.
- You will paint additional details on the heightmap channel.
- The Height you paint is composited through all the layers and converted to a normal map in real time, and finally blended with the normal from the high poly mesh.

All you have to worry about is painting that height, all the rest is done automatically.

Height HDR Format

The Height channel uses an **HDR** color format, which allows to paint positive and negative values without ever reaching a limit in brightness, contrary to traditional height maps which will saturate between 0 and 255.

- When painting with a bitmap or substance on a height, that source is remapped from its original [0,255] range to a [-1,1] range.

A mid grey will be remapped to 0. Therefore, values below 127 will **substract** from the heightmap while values above 127 will **add** to it when using the default blending mode set for the height maps, **Linear Dodge (Add)**.

- When painting with plain color, you will be able to select values between -1 and 1 directly.

Height Visualization

When visualizing the Height map in Solo mode, the default preview will only show positive values, with strong black saturation for negative values.

The **+/- color** setting allow to visualize the full range using a differetn color for the positive and negative values.

The **Scale** setting allows to modify the visible range of that HDR map in case you've added or subtracted more than the default [-1,1] range.
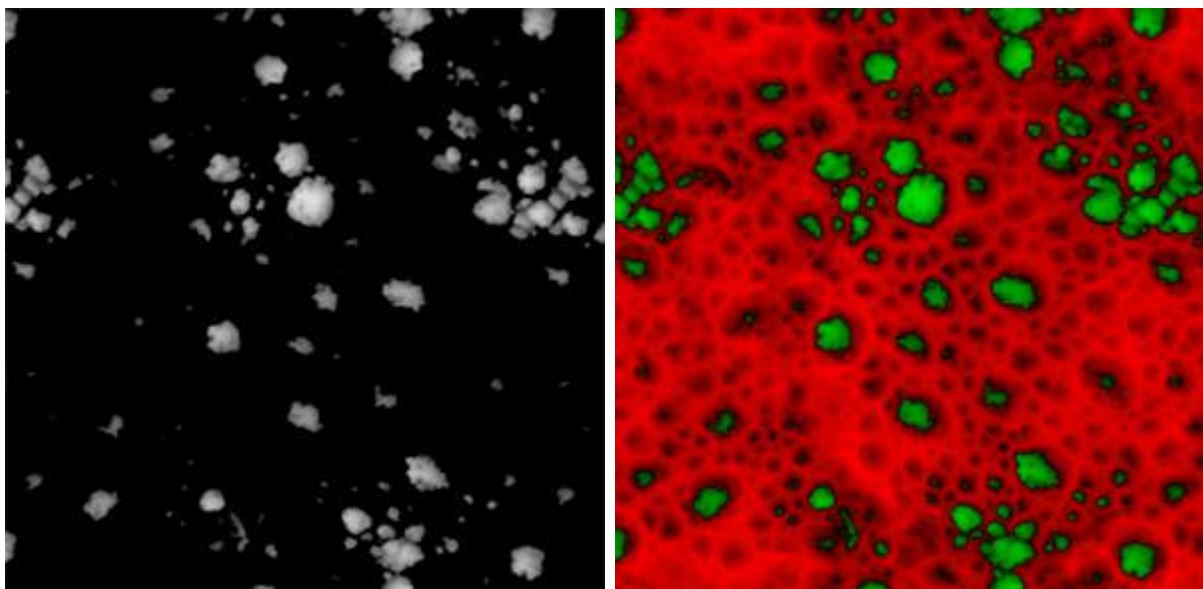
Normal Map Painting

Painting details can be also be done through painting Normal map data directly on your mesh. To paint normal map details, your document needs a Normal Map channel first. This can be set up in the TextureSet Properties window if you have one already. You will also need a brush or material with a normal map channel enabled.

From there, painting with a normal map is very similar to painting with a height map, with the added precision of a baked normal.
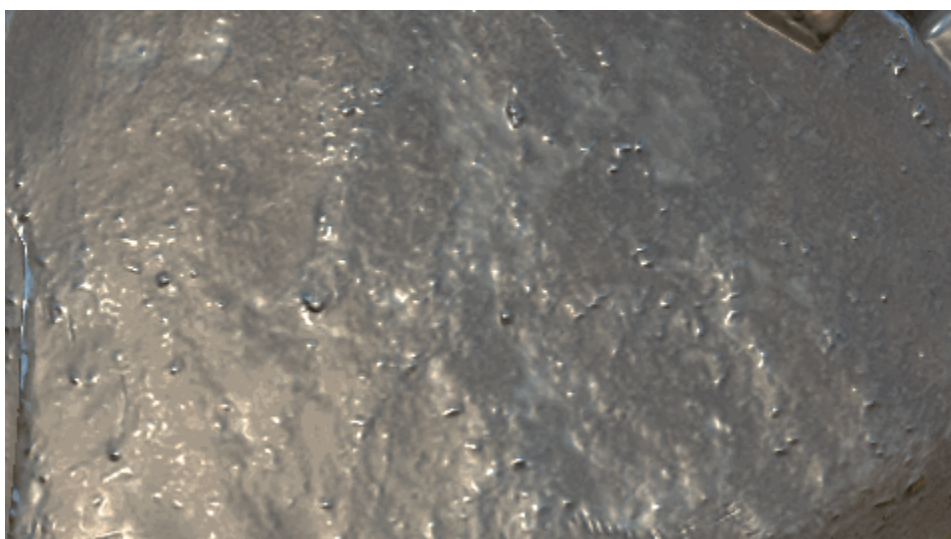
Normal blending modes

Normal maps have their own blending modes in the layer stack (based on these blending algorithms) :

- **Normal map Detail** (default) - Consider the current layer as detail information
- **Normal map Inverse Detail** - Consider the bottom layer as detail information
- **Normal map Combine** - Combine top and bottom layer with the same intensity/extent

Normal Color Space

When loading a normal map into the slot of a material (tool properties or fill layer), you can change the default color space. This is useful since Substance Painter expect DirectX normal maps by default (it's unrelated to the project setting). Therefore when using an OpenGL normal map, it is required to click on the little arrow to open the color space menu and then change the color space of the bitmap.
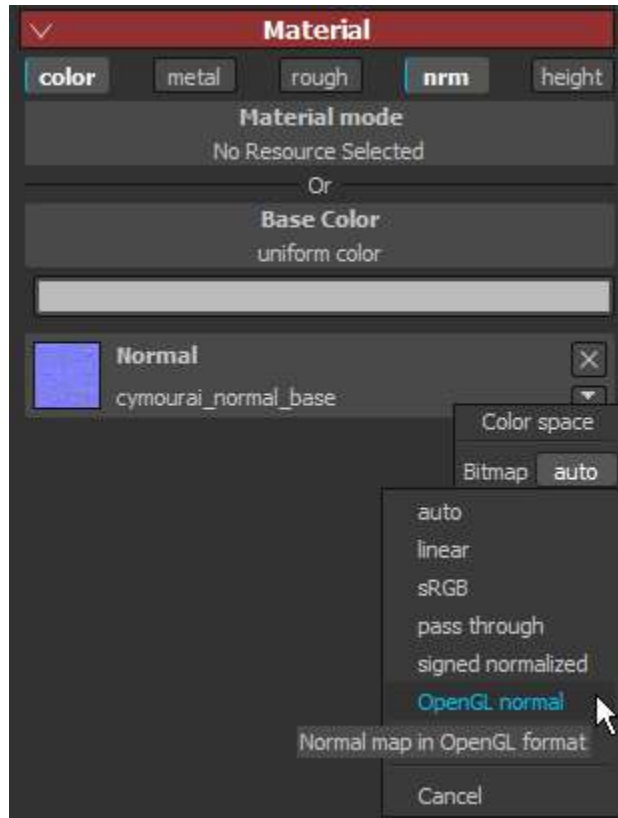
Painting over a baked normal map

In some situation, it can be useful to paint over the baked normal in order to hide details or even fix baking issues.
The default setup of a project in Substance Painter doesn't allow that, as it computes the normal channel and the baked normal separately.
However it is very easy to change.

1 - Changing the texture set blending mode

By default a texture set is created with the "normal mixing" set to "combine. In order to change the normal map it's important to set it to "replace" instead. The normal map will disappear from the viewport, but that is expected.

Changing this mode to replace indicate to Substance Painter to only export the normal map channel and the height channel when generating the final normal map.
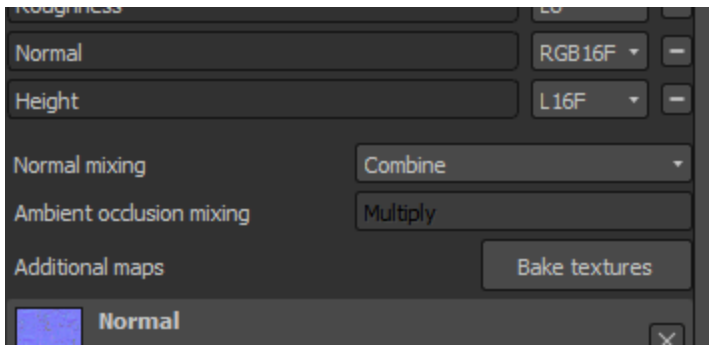
2 - Setting a fill layer with the baked normal map

Create a new fill layer and put the baked normal inside the "normal" slot, via the properties panel. Don't forget to change the default tilling of the fill layer if it not set to 1.
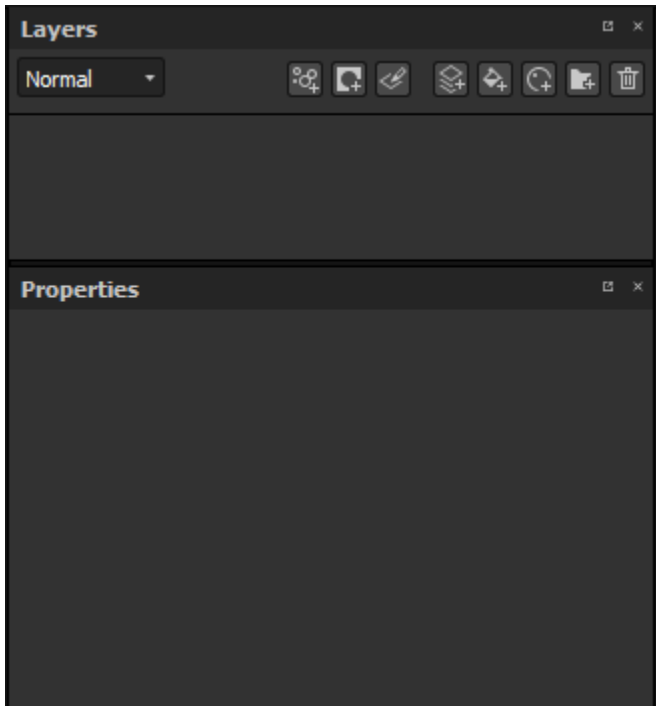
3 - Changing the fill layer blending mode

By default, the blending mode of the normal channel on any new layer is set to "Normal map details". Since it is preferable to use the fill layer as the base, we chose the "normal" blending mode since the bitmap don't have any alpha, it will replace everything below (including the default color of the shader).
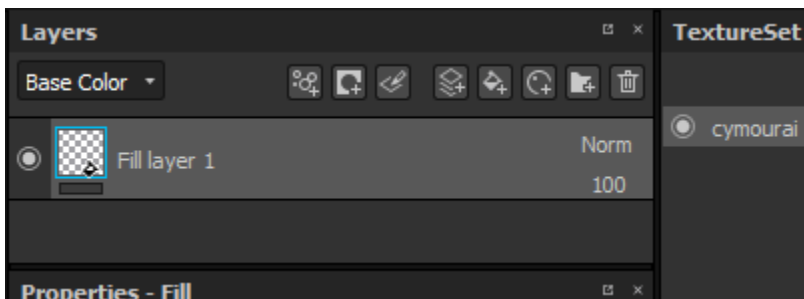
4 - Creating a layer to paint over the baked normal map

Create a new layer (regular or fill) and change its blending mode to "normal" for the normal channel. Once this setup is done, anything painted on the normal channel will take over the baked normal map that is on the layer below.
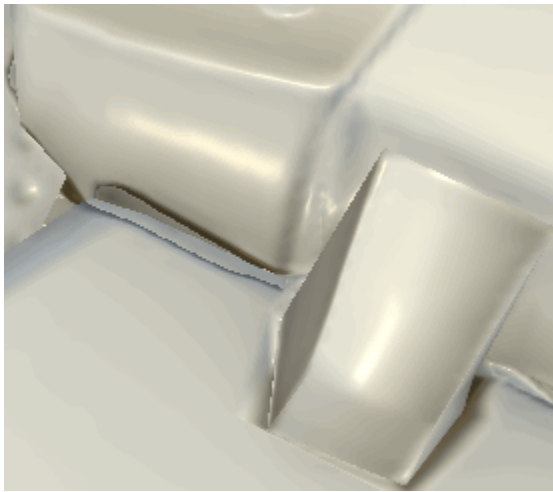
Dynamic Material Layering

The Dynamic Material Layering is a specific workflow where generic materials are mixed together inside a shader instead of into a single texture. The main advantage of this workflow is that the blending is dynamic and allow to control and preserve a certain level of quality by tilling generic materials inside the shader. While materials are generic, the mask used to blend the materials are specific to mesh and therefore don't repeat.

> To enable the material layering workflow, a specific shader is required.
> The shader "**pbr-material-layering**" shipped by default with Substance Painter allow to blend 4 materials with 3 masks.
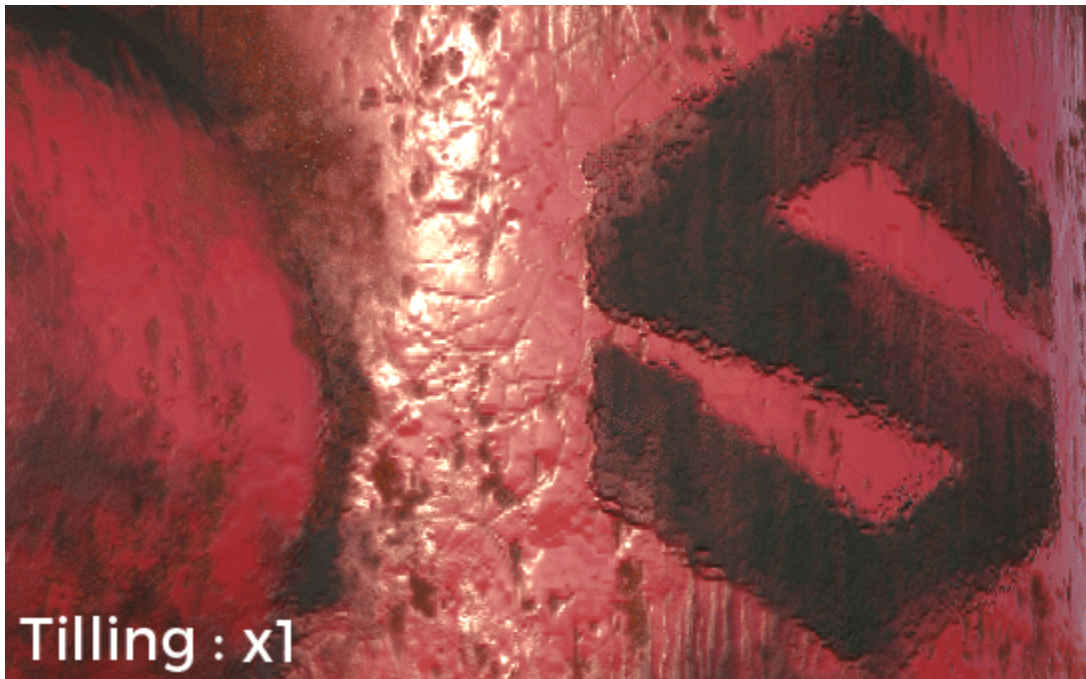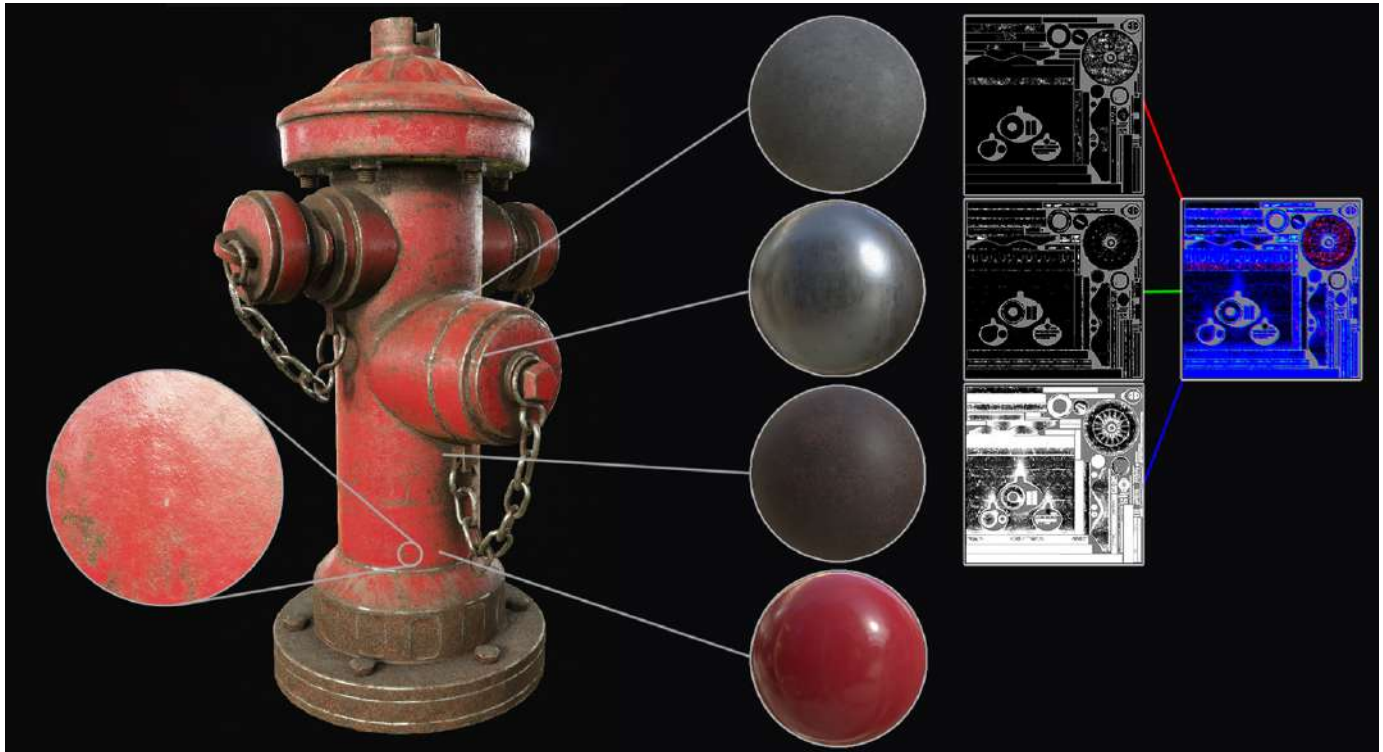
Sub-Layer stacks

In this shader sub-stacks can be defined and be sampled directly by the shader. Example with the shader "pbr-material-layering" shipped with Substance Painter :

```
//: stacks [
//:   {
//:            "id": "Mask",
//:     "channels": [
//:                       {"id": "opacity"}
//:                ]
//:   },
[...]
//: ]
```

In this example, the shader will create 3 sub-stacks on a given texture set with an "opacity" channel in each. Sub-stacks can be accessed in the TextureSet list window :
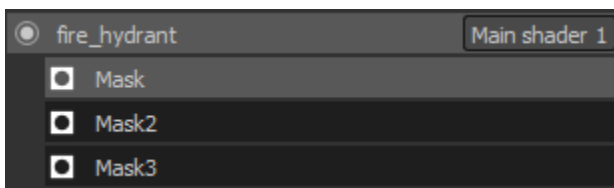
Because the **channels** of the sub-layer stacks are defined **in the shader**, it is impossible to add new channels in the texture set settings. To add or remove a channel an update of the shader file is required.

> The number of channels supported maximum is defined by the number of sampler in total supported by the hardware.
> While Substance Painter supports bindless textures (ans thus unlimited amount of textures) for materials loaded as parameters, the channels that are provied by the engine of the layer stacks are limited to 32 (on Windows). This limit also includes other textures such as the Normal and the Ambient Occlusion baked on the mesh of the project.

Materials inputs

While it is possible to setup sub-stacks to define Materials in addition to Masks, it is often more practical to just define material inputs in the shader and use materials from the shelf directly. Most of the time these materials also exist in the final application such as Unity or the Unreal Engine 4. The naming convention to declare materials looks like the following in the shader "pbr-material-layering" :

```
//: materials [
//:   {
//:       "id": "Material1",
//:       "label": "Material 1",
//:       "default": "",
//:       "size": 1024,
//:       "default_color": [0.5, 0.5, 0.5]
//:   },
[...]
//: ]
```

Here is the result when some materials (substance materials or material presets) have been loaded :

The material resolution can be defined with the "size" parameter. It is also possible to load materials by default when the shader is created with the "default" parameter (by using the name/label of the ressource that need to be loaded).

To access the materials and mask in the shader itself, simply connect them with the "param auto" keyword :

```
//: param auto Material1.channel_basecolor
uniform sampler2D color1;


//: param auto Mask.channel_opacity
uniform sampler2D mask;
```

Parameters Export and Import

In this specific workflow the most important part are the mask and the shader parameters. Therefor in the export window of Substance Painter it is recommended to enable the "**Export shaders parameters**" setting. This will create a **JSON** file on the disk next to the textures that will contains information about the sub-stacks setup, the materials used and the shaders and their parameters.

At the moment the packing of masks into a single texture is not supported during export. However a simple workaround to that would be to use the scripting features and call the Substance Batch Tools to do the packing with a Substance instead.
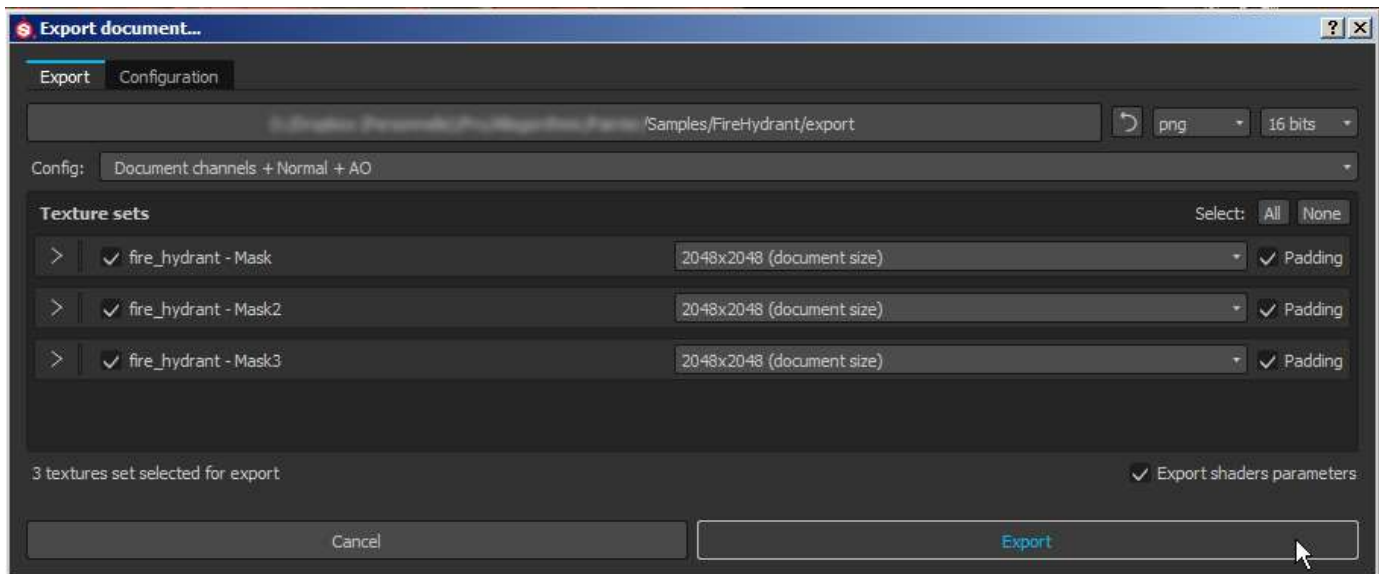
This JSON file can then be used to setup the layer stacks and shaders of a project.
This allow to do back and forth between multiple application easily by sharing common parameters.
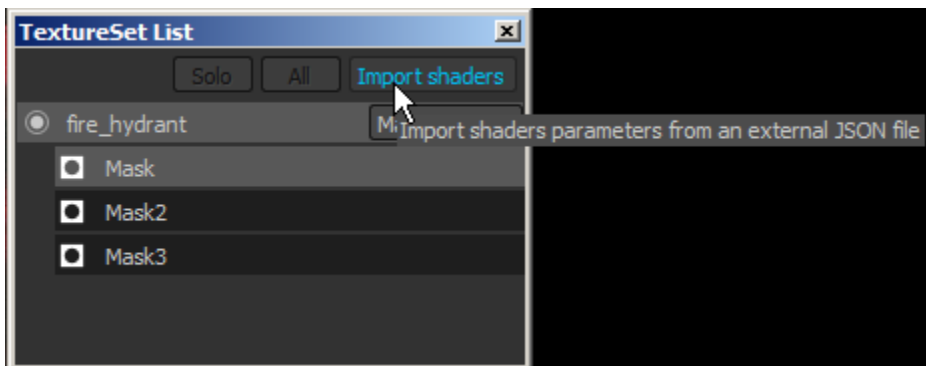
Iray Renderer
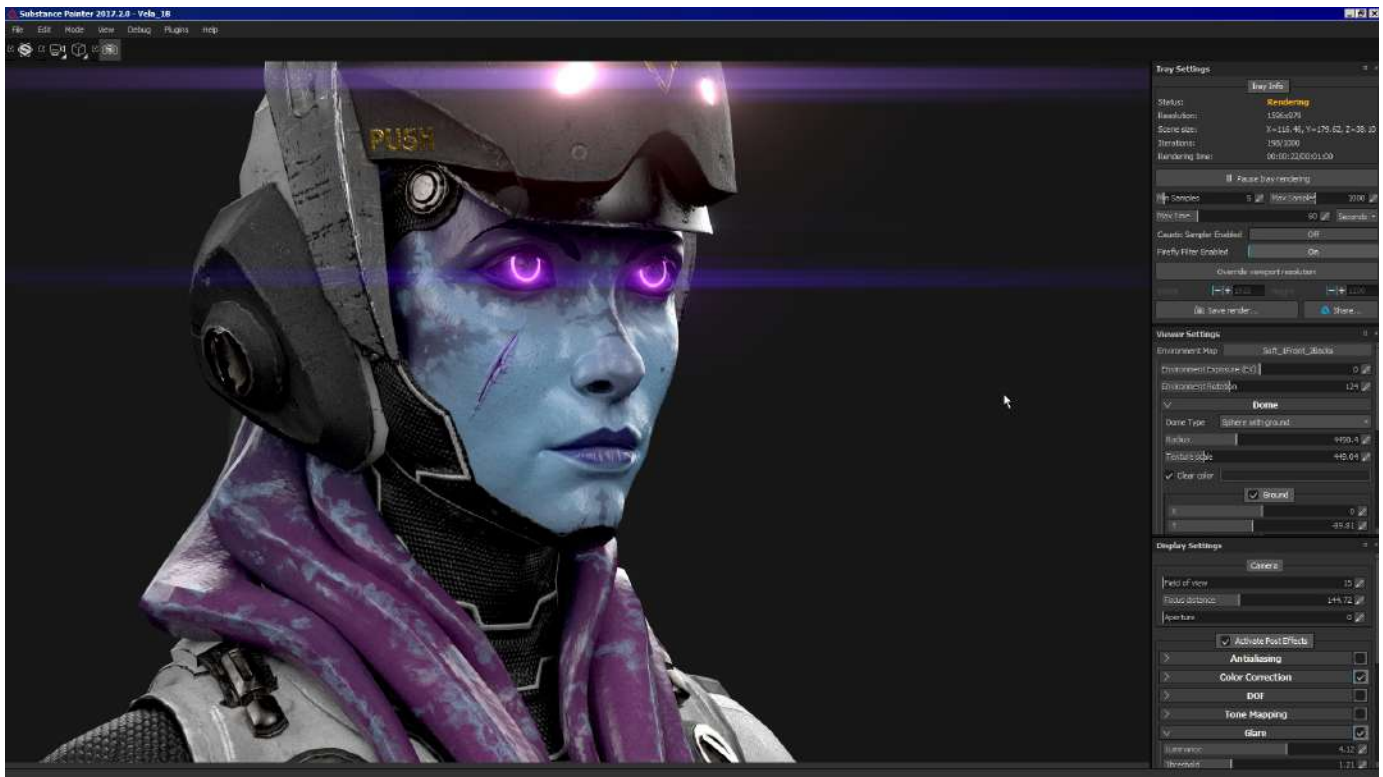
Iray is a GPU accelerated path-traced renderer developed by Nvidia.
With Iray it is possible to create image with a great accuracy of lighting in the scene and in high-definition (large resolution).

Iray Mode

In order to start Iray, the mode of Substance Painter has to be changed.
This can be done by pressing in various ways :

- By pressing the **F10 key** (or **F9** to go back to to the Painting mode)
- By clicking on the Camera icon in the main toolbar
- By using the Mode menu
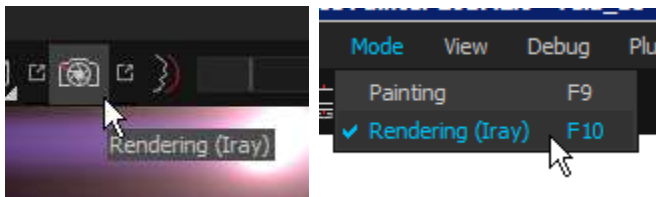
Iray Parameters

Iray use a specific set of parameters but also common properties shared by the regular viewport of Substance Painter.

- Iray Settings
- Viewer and MDL Settings

Display Settings

The Display settings let you control the camera and post effects settings.
They are identical to the regular viewport rendering, therefor they allow to be in sync and avoid unwanted lighting differences.

For more details, see the dedicated page : Display Settings

Iray Settings
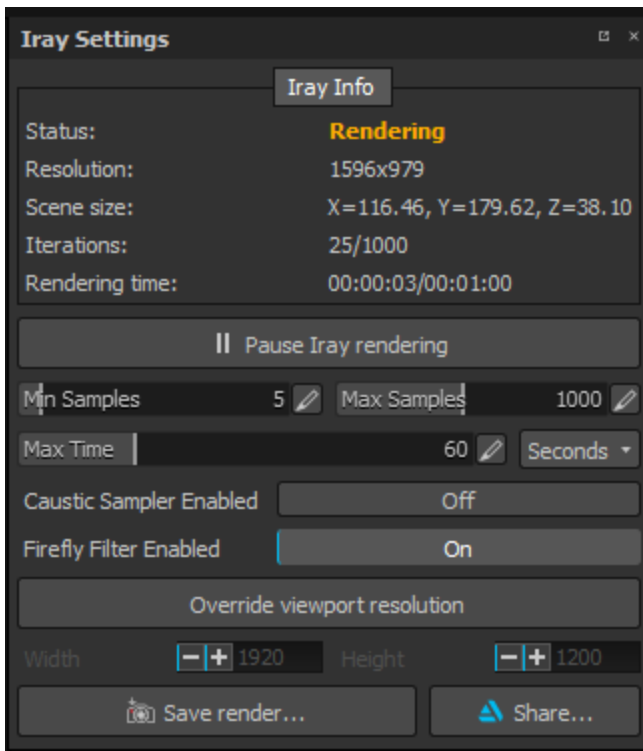
The Iray settings control the rendering of the IRay viewport, how long it will run and the quality of it.

Iray Information

The top section of the window display the status of Iray alongside other information.

Setting	Description
Status	The status indicate how Iray is working : • **Rendering** (Iray is computing the image) • **Paused** (Iray computed stopped but has not finished) • **Done** (Iray computation finished, or reached the settings values)
Resolution	The resolution of the Iray image (by default dependent of the viewport size).
Scene Size	The bounding box size of the scene/3D Mesh. There is no unit, but it is assumed to be in centimeters.
Iterations	The number of computation passes done by Iray over the maximum defined in the settings.
Rendering time	Time elapsed doing a render over the maximum time defined in the settings.

> The number of iterations will define the final quality of the render : more iterations = better quality.
> However iterations can take some time, that why it is possible to define a maximum time. An iteration is defined by the number of samples.

Settings

As soon as a setting has been modifier, Iray will start computing the rendering.
It is possible to pause Iray to avoid this behavior with the dedicated button :
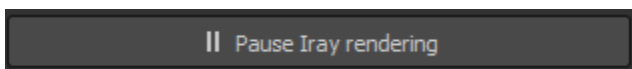
Setting	Description
Min Sample	Minimum amount of samples performed by pixels
Max Sample	Maximum amount of samples performed by pixels
Max Time	The maximum amount of time allowed for Iray to do its computation. The dropdown on the right allow to set the unit (seconds, minutes, or hours).
Caustic Sampler Enabled	This option allow to compute more advanced lighting reflections (caustics).
Firefly Filter Enabled	This option allow to get rid of isolated and very bright pixels that can happen sometimes.
Override viewport resolution	This setting allow to define a custom size for the rendering, instead of using the current viewport size. The **Width** and **Height** setting below allow to define it in amount of pixels.
Save Render	Action to export the current render (even if unfinished) to a file.
Share	Allow to share/export the current render to ArtStation.

Viewer and MDL Settings
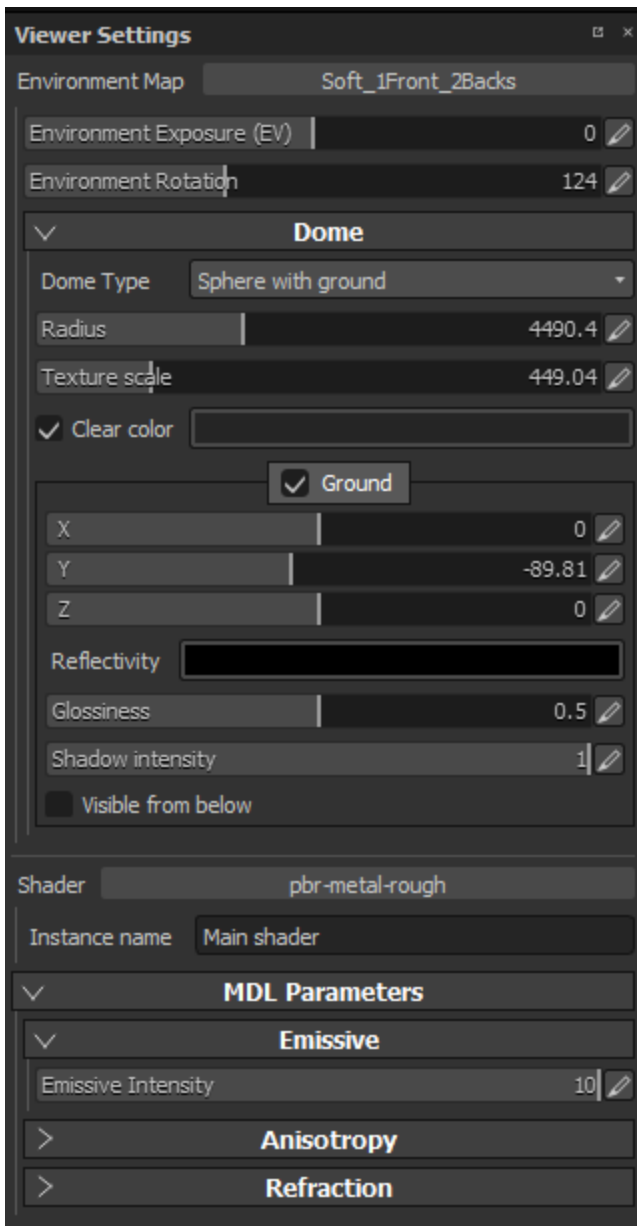
Environment

Identical to the regular viewport, the environment map used in Iray will control the lighting.
The environnement map can be changed by clicking on the button or by drag and dropping an HDR texture into it.

- **Environment Exposure** : Control the exposition level of the HDR environment map.
- **Environment Rotation** : to shift the environment texture and rotate the lighting around the scene.

> Iray being a physically based renderer, the environment texture will greatly defines the lighting and the look of your scene.

Dome

The dome is the shape on which will be projected the environnement map in the background.
3 types of dome are available, to use depending of the scene :
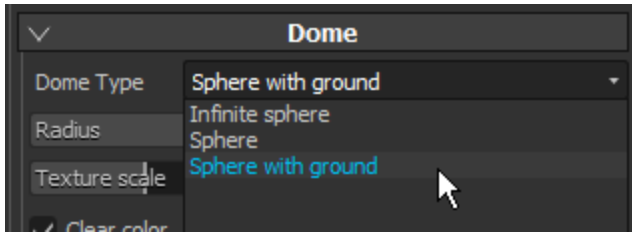
- **Infinite Sphere** : The environnement is project in the background on a sphere to simulate the horizon, so always far from the scene
- **Sphere** : The environnement is projected on a regular sphere, that can be scaled
- **Sphere with ground** : Similar to the previous shape, this one also has a control to flatten the bottom of the sphere to simulate a floor.

The Sphere with ground has a control to define the size/radius of the floor, however a big radius will create distortions on the environment.
Depending of the type chosen, the lighting can be affected.
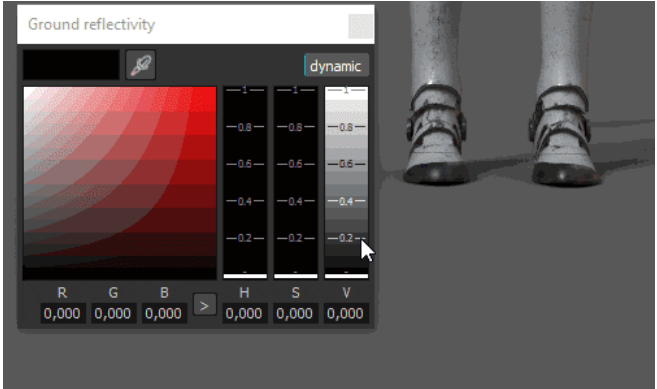
Additional settings are available :
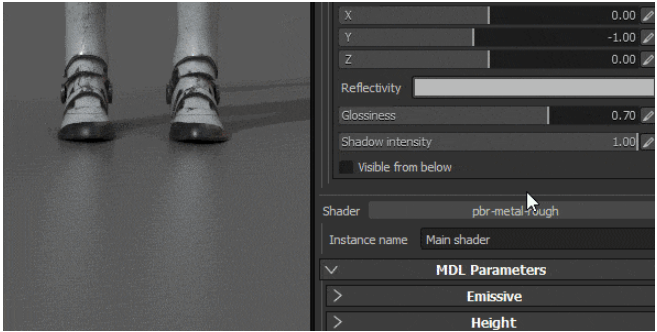
Setting	Description
Radius	The size of the sphere (if not infinite)
Texture Scale	How much the texture will be stretched for the **Sphere with ground** type.
Clear Color	If enabled, replace the background image of the environment map with an uniform color. This will affect the lighting.

Ground settings

The ground settings allow to specify where a floor is located.
By default the value is set to fix the bottom of the bounding box of the scene.

Setting	Description
X, Y, Z value	Define the location of the floor on the three axes. The 0,0,0 value corresponds to the middle of the scene's bounding box.
Reflectivity	Defines the intensity and the color of the ground reflection. A white brightness value means that the ground is 100% reflective while black means not reflective at all.
Glossiness	Defines how glossy (or rough) is the reflection.

Shadow Intensity	This parameter defines the final opacity of the shadow after the lighting has been computed.
Visible from below	Defines if the ground is visible from below or not. If checked, it means that the ground will occlude any element above it.

MDL and Shader parameters

Iray use MDL to define the materials used for the rendering of an object. For more information, see the official Nvidia page of the format.

By default in Substance Painter, an MDL is associated with a GLSL shader, allow to switch between the regular viewport and Iray without having to configure anything.
The parameters of the MDL are then displayed in the bottom of the viewer settings. Below are the parameters of the default MDL (Compatible with the PBR Metallic/Roughness shader).

To load custom MDLs, a custom glsl shader is required.
In the shader, some metadat can be added to specify the mdl path :

```
//- Declare the iray mdl material to use with this shader.
//: metadata {
//:    "mdl":"mdl::alg::materials::physically_metallic_roughness::
physically_metallic_roughness"
//: }
```

- **mdl**: define the Iray mdl material to use with the shader. The path syntax is as follow: *mdl::folder1::folder2::mdl_filename:: material_name* where *folder1::folder2::mdl_filename* is the path inside one of your shelf *mdl* folder to a mdl file and *::material_name* is the name of a material declared inside this mdl file. (ex: "mdl" : "mdl::alg::materials:: physically_metallic_roughness::physically_metallic_roughness")

For each Material Instance in a project a MDL will be set. Therefor to separate the materials properties between Texture Set, set new Materials instance to configure spearately the MDLs.
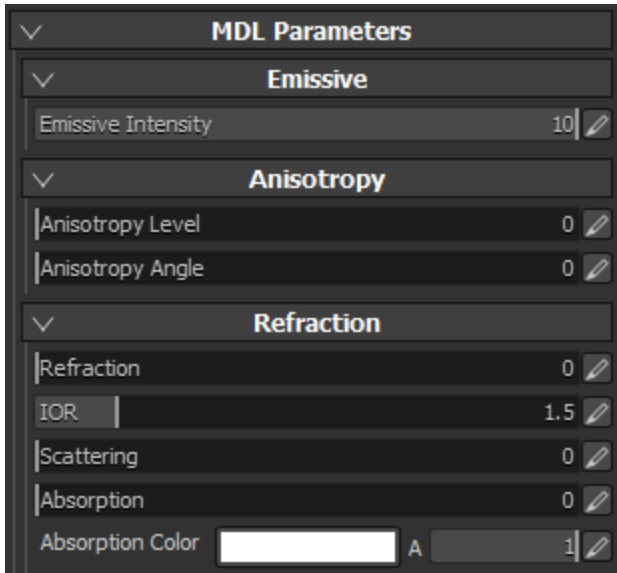
The default MDL of Substance Painter supports the following properties :

Setting	Description
Emissive Intensity	Multiplier of the Emissive channel. A high value will start to emit light.
Refraction	Controls the amount of Refraction.
IOR	Defines the index of refraction of the material. Note : Air = 1.0, Water = 1.2, Glass = 1.5.
Scattering	Controls how much light is scattered through the surface.
Absorption	Controls how much light is absorbed through the surface.
Absorption Color	Simulates shifts in color when light passes through the surface.

Quick Mask

Quick masking allows you to mask parts of your mesh you don't want to paint on. It works in a similar way as the masking in ZBrush.

- Hit **T** to switch to quick mask edit mode, this will allow you to paint a temporary mask.
- Hit **T** again to switch back to your previous tool and paint across that mask.
- Hit **Y** to reset/disable the mask.
- Hit **I** to invert the mask while in quick mask edit mode.

Custom Shaders

It is possible to use custom shaders in **GLSL** and use them in Substance Painter.

You can either :

- You can find already existing shaders on Substance Share.
- You can write your own shader. The documentation to write those shaders is available via the menu **Help > Shader documentation** in Substance Painter.

Plugins

Substance Painter has a dedicated Scripting API that allow to create custom plugins to add custom functionalities and behavior.
The plugin are wrote in Javascript and can be combined with the QML language to create custom interface inside the application. For more details on what is available in the API, take a look at the scripting documentation (available from the help menu of the application).

Default plugins

Substance Painter has two default plugins showcasing different.

- Autosave
- Creating a plugin
- Live-Link with Unity
- Resources Updater
- Substance Source

Autosave
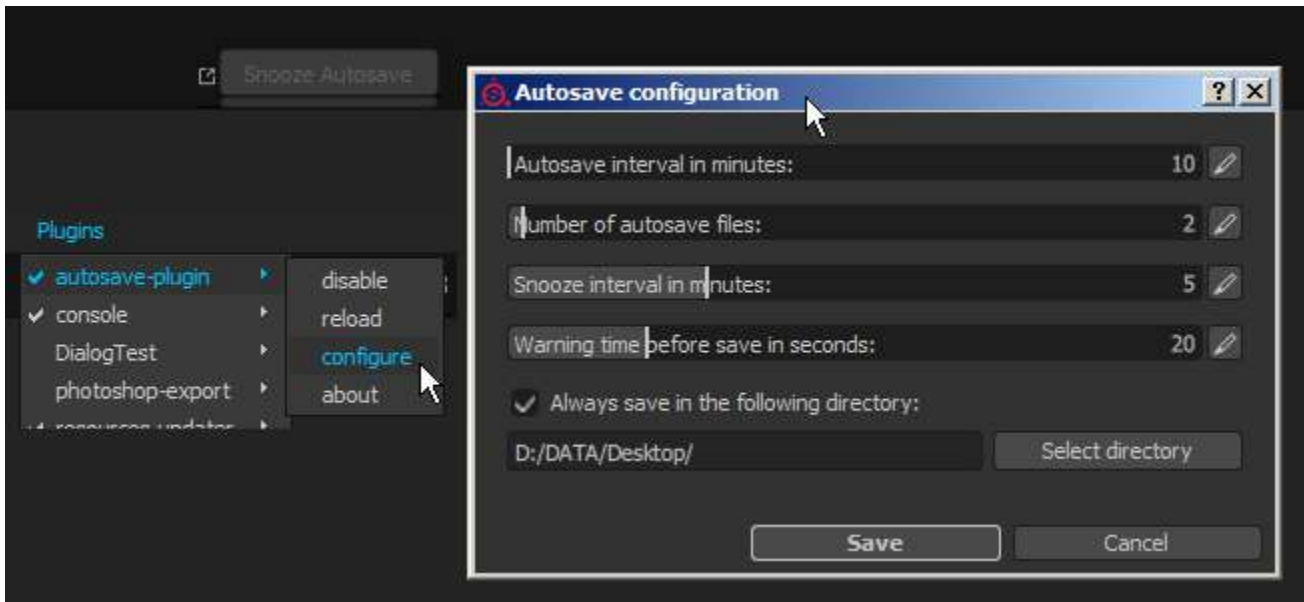
The autosave plugins allows to **create backups** of the currently opened project. It creates a file on the side while keeping the current project untouched.

The backup files will be located in three possible locations :

- If the current project has been saved the backups will be next to it.
- If the project has never been saved (untitled) the backups will be in the autosave folder in the user's Documents folder. (**Documents /Allegorithmic/Substance Painter/autosave**)
- If the override setting has been enabled the backups will be located in the path given in the settings.

A snooze button is available in the interface to delay the autosave.

How does the autosave trigger ?

The autosave is based on an internal timer, once the timer is over the autosave process begins.
The snooze button will activate itself when near the end of the timer, allowing to delay the autosave for a few amount of time.

All the time based values can be modified via the settings window.

How to disable the autosave ?

If for any reason disabling the autosave process is needed, it can be done via the plugin menu. To do so, click on **Plugins** > **Autosave** > **Disable** menu.

Configure the Autosave

To configure the autosave behavior, click on **Plugins** > **Autosave** > **Configure** menu.

- **Autosave interval in minutes** : indicate how much times to wait between each autosave.
- **Number of autosave files** : the amount of backup files created maximum for a given project.
- **Snooze interval in minutes** : how long the autosave will be delayed when clicking on the snooze button.
- **Warning time before save in seconds** : how long before the snooze button is active and the progress bar is visible before the autosave trigger.

> The autosave timer will pause if :
>
> - The engine is doing a computation
> - Textures are being exported
> - The configuration window is open
> - The project is currently being saved

At the bottom of the window it is possible to override the default location of the backup files.
When the setting "**Always save in the following directory**" is enabled, all the backup file will be located in the given folder (default path is the user's Documents folder).

Creating a plugin

The documentation about the scripting API to create plugins is available via the help menu.

Adding a plugin require to put a folder with its name inside the plugins folder, available in the user documents folder :

> - **Windows** : C:\Users*username*\Documents\Substance Painter\plugins
> - **Mac OS** : Macintosh > Users > *username* > Documents > Substance Painter > plugins
> - **Linux** : /home/*username*/Documents/Substance Painter 2/plugins

Live-Link with Unity

This plugin allows you to create a live link between Unity and Substance Painter: what you see in Substance Painter is what you get in Unity.

This plugin is currently in Developer Preview. You can download it on Substance Share: https://share.allegorithmic.com/libraries/3088
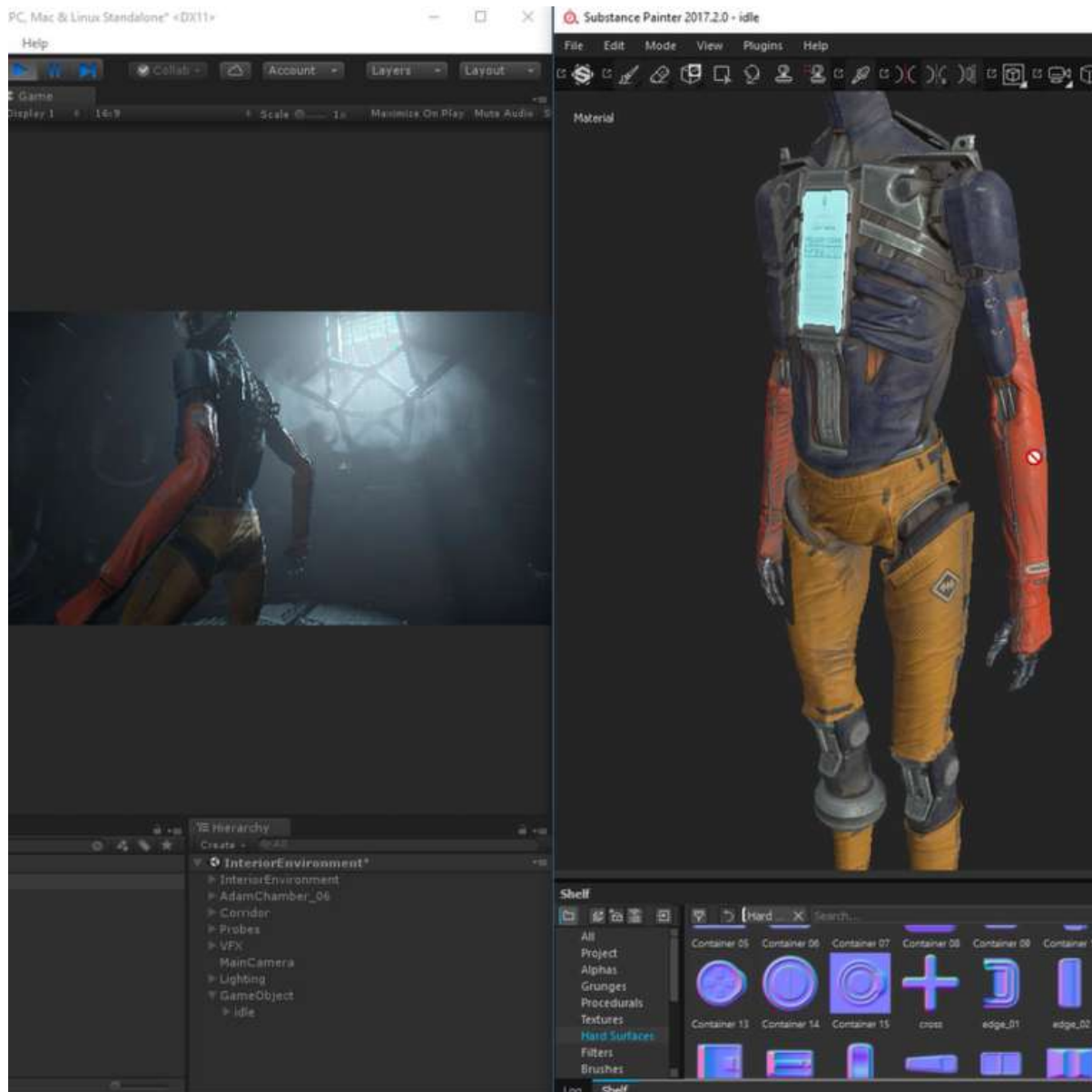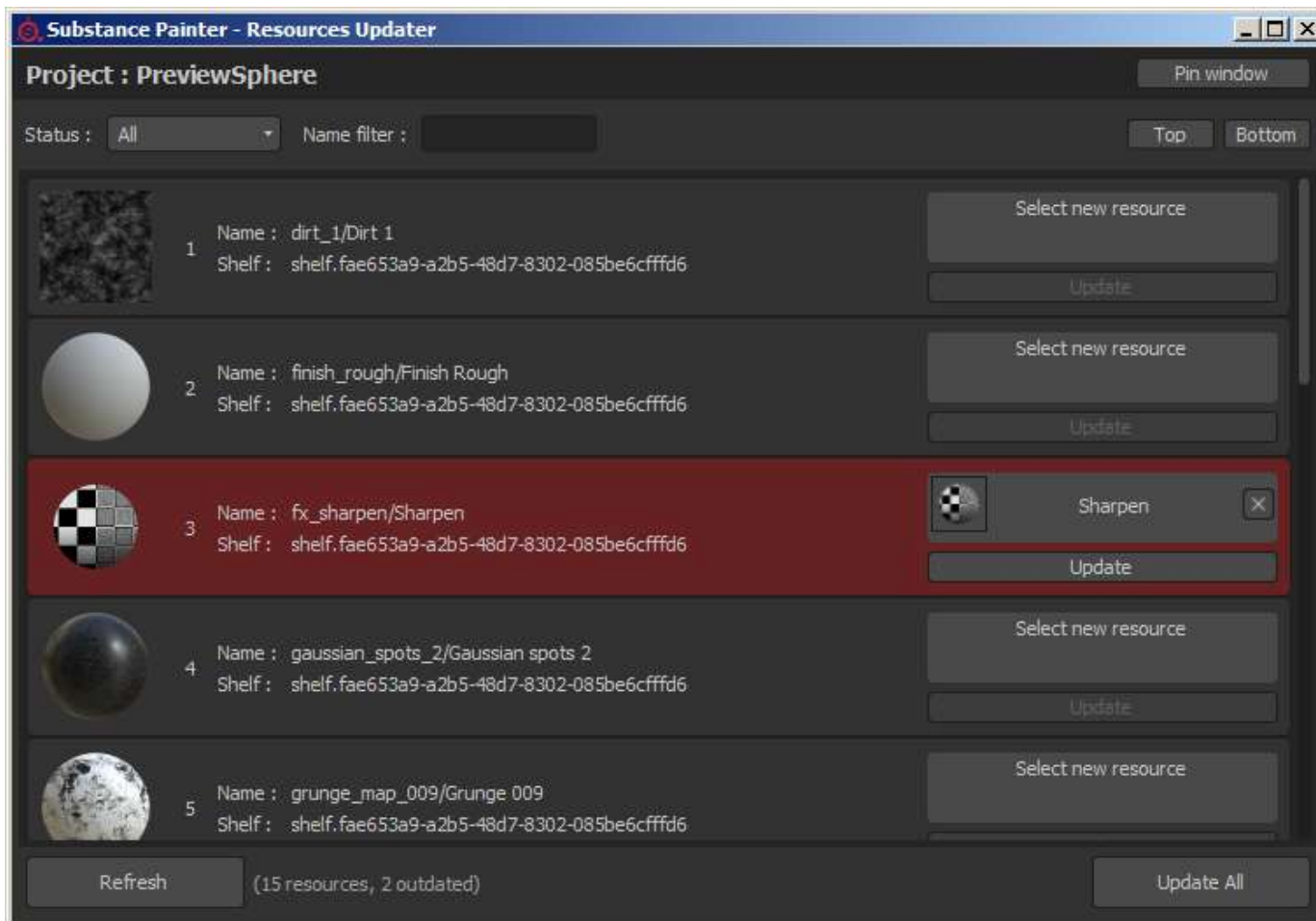
Resources Updater

The **Resources Updater** plugin allow to browse resources present in the currently opened project.
Each resource can be replaced by an other one present in the shelf. Resource showed in red are considerate as "outdated", it means a different version of the same resource is present in the shelf and is (probably) more recent.

Substance Source

The Substance Source plugin is an integration inside Substance Painter of the online material database which allows to download PBR materials directly into the shelf.
For more information, see : https://www.allegorithmic.com/products/substance-source
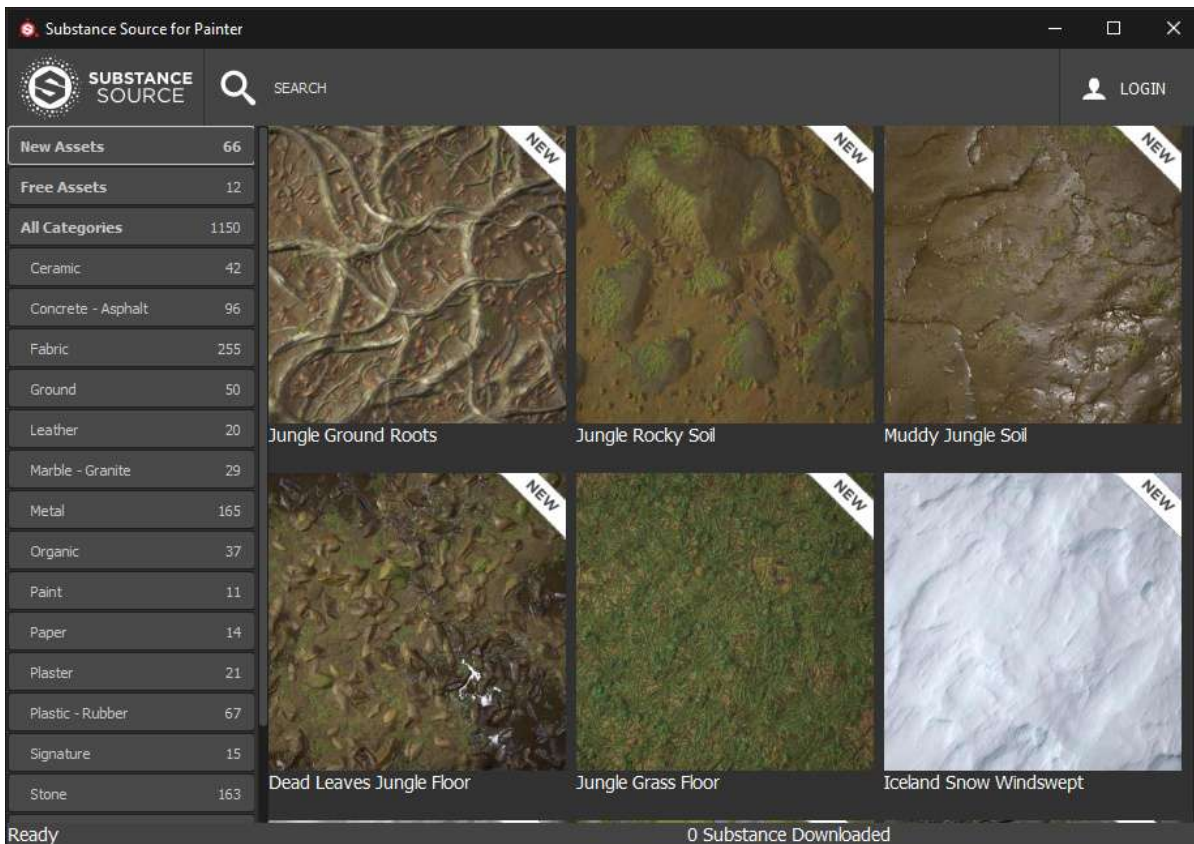
Because of a recent change of the Substance Source platform an update of the plugin is required to be able to download materials again.
This update is **manual** for user of Substance Painter **2017.1** to **2017.3**. Substance Painter **2017.4** and **newer** already have the updated plugin.

To install the new plugin :

1. Download the new plugin : substance-source-plugin-1.0.3.zip
2. Go into your user "**Documents**" folder (see Creating a plugin)
3. Go into "**Allegorithmic**" then "**Substance Painter**" folder
4. Go into the "**plugins**" folder
5. Remove the existing "substance-source" folder
6. Extract the content of the **zip** archive into the folder
7. Reload the plugin if Substance Painter is already running

Command Lines

Substance Painter support multiple command line that can be used when launching the application.

Explicit command lines

You can use them as following : **substance painter.exe** command_name *[option]*
You can also use the command **--help** to get more details.

- **--help** / **-?** / **-h** : display information about which command line are available and how to use them

- **--version / -v** : display the current version of Substance Painter

- **--mesh** <meshPath> : Mesh to load in the project
Example (Create a new project with a specific mesh) : **"substance painter.exe" --mesh "E:\\MymeshFolder\\MyMesh.obj"**
Example (Update the mesh inside an existing project) : **"substance painter.exe" --mesh "E:\\MymeshFolder\\MyMesh.obj" "E:\\MyM**

eshFolder\\PainterProject.spp"

- **--mesh-map** : Baked maps associated with the mesh (AO, Normal, Curvature). Can be specified multiple times. Nomenclature : TextureSetName_AdditionalMapSlot
  - Ambient occlusion = *ambient_occlusion*
  - Curvature = *curvature*
  - Normal = *normal_base*
  - World Space Normal = *world_space_normals*
  - Position = *position*
  - Thickness = *thickness*
  - ID = *id*

  Example : **"substance painter.exe" --mesh "E:\\MyMeshFolder\\MyMesh.obj" --mesh-map "E:\\MyMeshFolder\\DefaultMaterial_ambient_occlusion.png"**

- **--export-path** : Default export path where the outputs of the project will be exported.

Hidden command lines

- **--disable-version-checking** : Don't check if a new version of the application is available when starting up

Release Notes

Here is what's new in Substance Painter by version :

- Version 2018.1
- Version 2017.4
- Version 2017.3
- Version 2017.2
- Version 2017.1
- Old versions

Version 2018.1

Substance Painter 2018.1 introduces a brand new interface with a lot of improved behaviors. Performances have been improved as well in a lot of areas.

Release date : *15 March 2018*

Major Features

New interface and behaviors

Substance Painter 2018.1 introduces a **complete rework of the interface**, ranging from color and icons to widget behaviors.

- The **new interface** focus on bringing a brand new design, making it easier to read and less cumbersome to navigate.
  We reworked all our icons to be more explicit. We also reworked our color scheme which should now be more consistent.
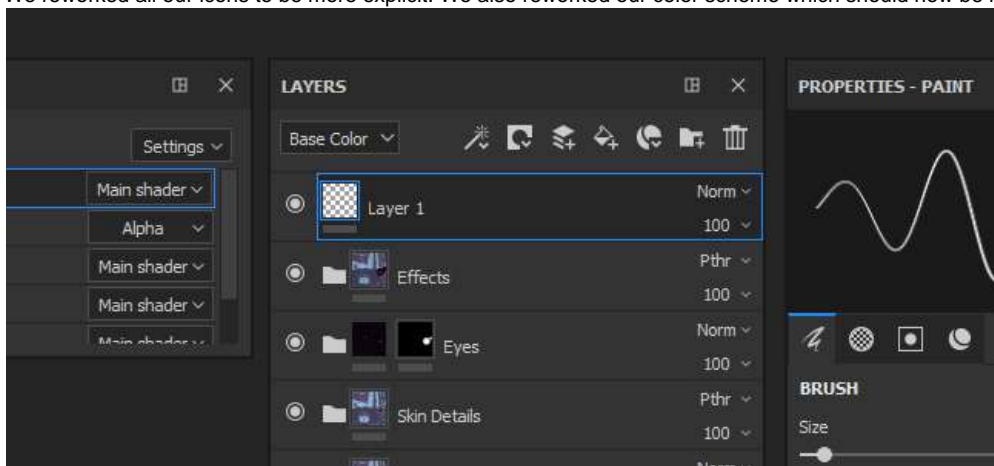
- We improved many widgets, especially our **sliders**, to be more **easy to use** with a **Tablet Pen**.
  You can click on the bar to move the slider or use the value field to more precisely edit the numbers.
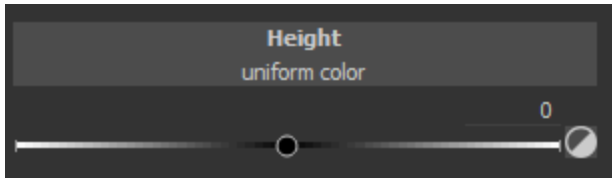
- We have a **new toolbar** that allows to open **Docks** on the fly.
  Clicking on one of the buttons in the toolbar will display the Dock next to its button and floating above the rest of the interface, re-clicking on the button will close it.
  If the dock move away from its button, it becomes a regular floating window which can be docked in the interface. If closed, the button will be available again in the Dock Toolbar.
  This new dock system works more easily with fullscreen. There is no need to have every dock always present in the interface anymore.
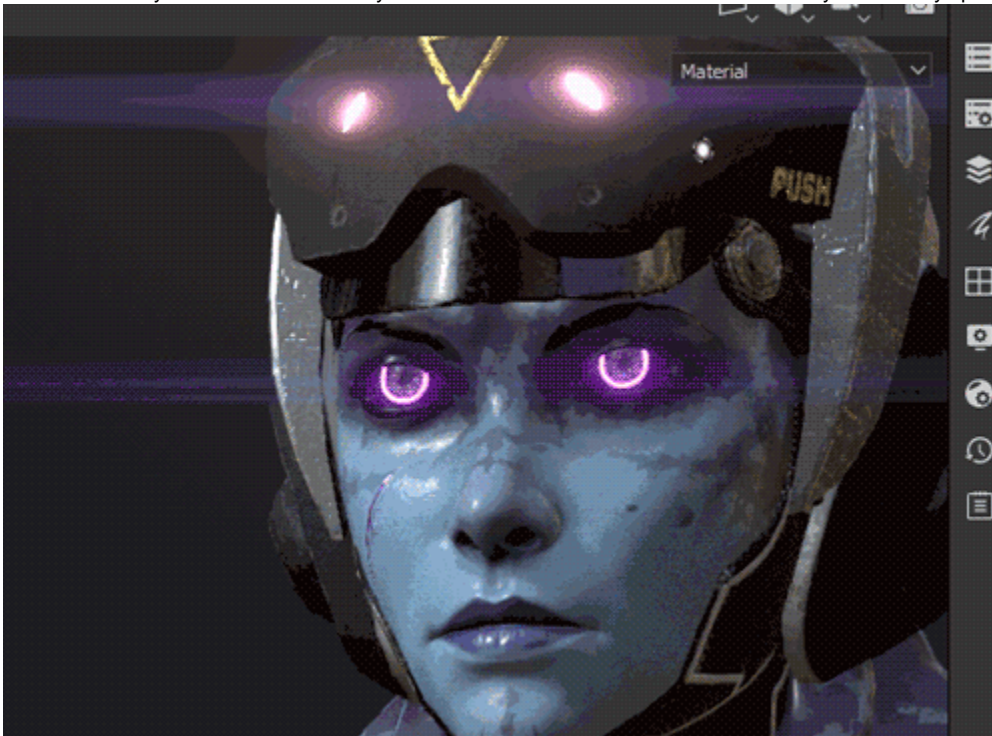
- Docks now use our new **Tab layout** which organise items into sections while still being able quickly scroll inside it.
  This Tab layout allows **big windows** and can present **all the information** at the same time, contrary to regular Tab systems that hide information.
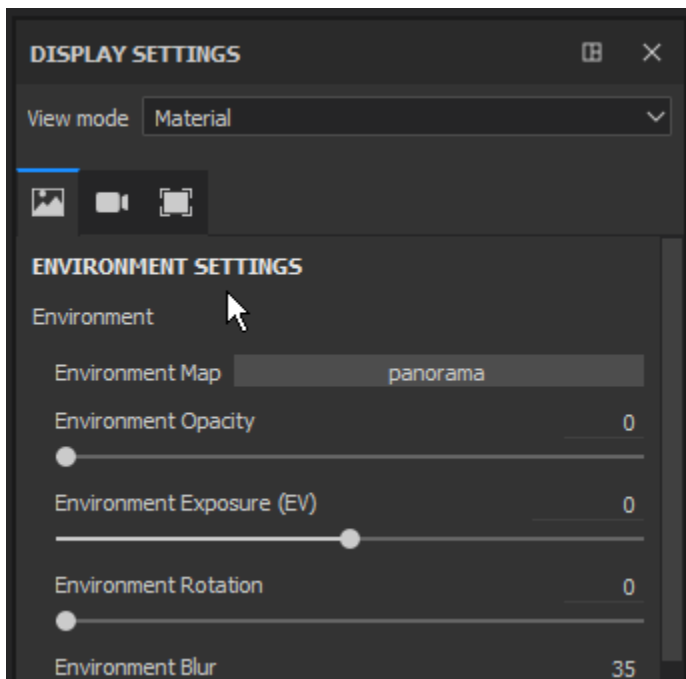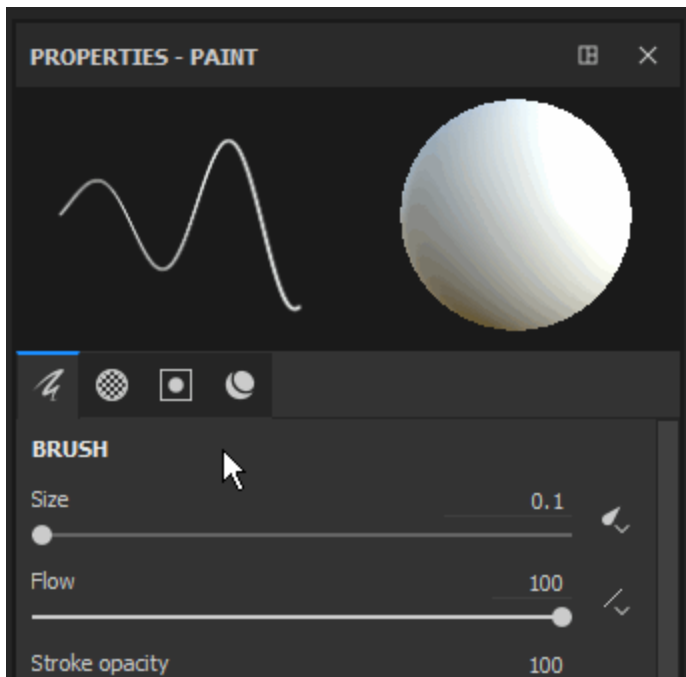
- There is now a **Quick Menu**, which makes **Tool properties** available **directly in the viewport**.
  To open the quick menu, simply **right-click in the viewport**. To **close** the quick menu, **click again in the viewport**.
  The menu will only close when clicking into the viewport, allowing the drag and dropping of resources from the shelf directly into the quick menu.

- There is now a new **Contextual Toolbar** at the top for the viewport.
  This toolbar change its parameters depending of the current tool used. It's a way to quickly access basic tool features (like the brush size).
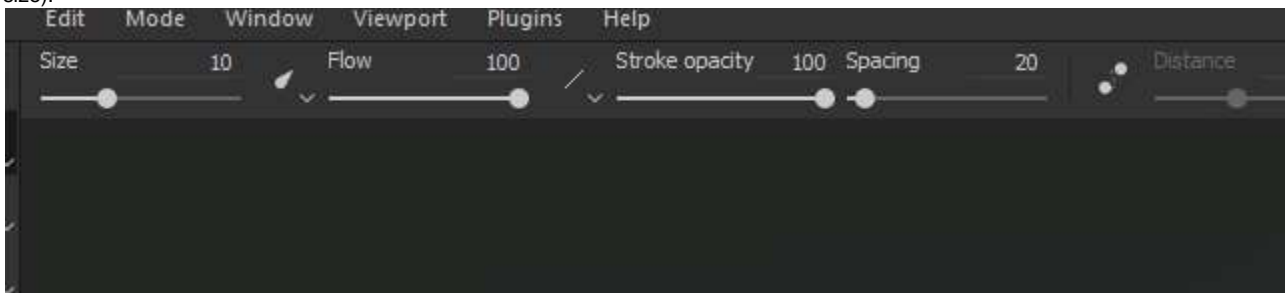
- It is now possible to **reorder effects** using **drag and drop** in the **layer stack**.
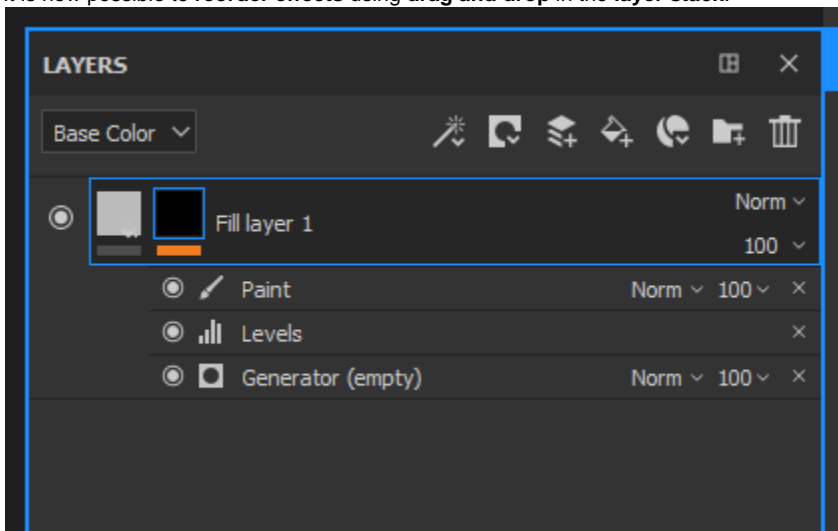
- While the shortcuts "**C**" and "**B**" allow you to quickly vizualise the **Channel** and **Baked textures** into the **viewport**, it is now possible to use the **unified dropdown** to change the viewport display.
  At the **top right** of the **viewport** there is now a dropdown listing **all the Channels and Mesh maps** (previously Additional maps). This unified dropdown is also available in the **Display Settings** dock.

- The **Display Settings** and **Viewer Settings** have been **merged** into a single Dock.
  Environment, **Camera** and **Viewport** settings are now grouped **together**, while **Shaders** parameters have been **moved** into a **dedicated Dock** instead.
  The Display Settings now takes advantage of the new **Tab layout** to quickly navigate the window.
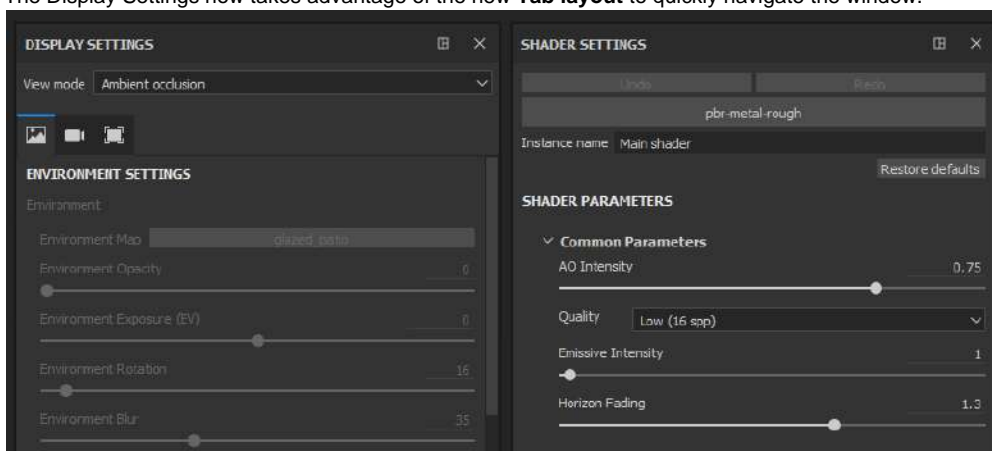
Drag and drop of Materials and Smart-Materials into the Viewport
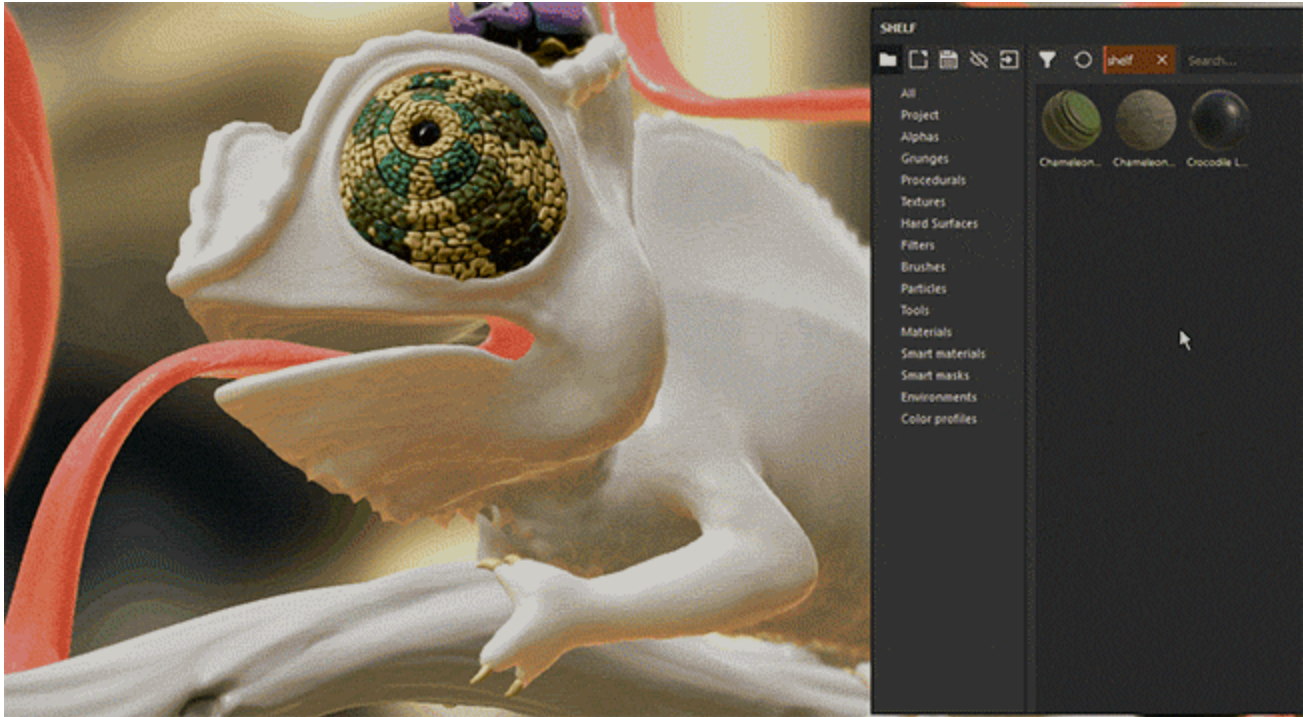
You can now **drag and drop** Materials and Smart Materials **directly into the viewport**.
This new action will **highlight the geometry** of the of the **target Texture Set** at the same time. This action will create the new layers at the top of the layer stack of the Texture Set.

Improved tablet pen behavior
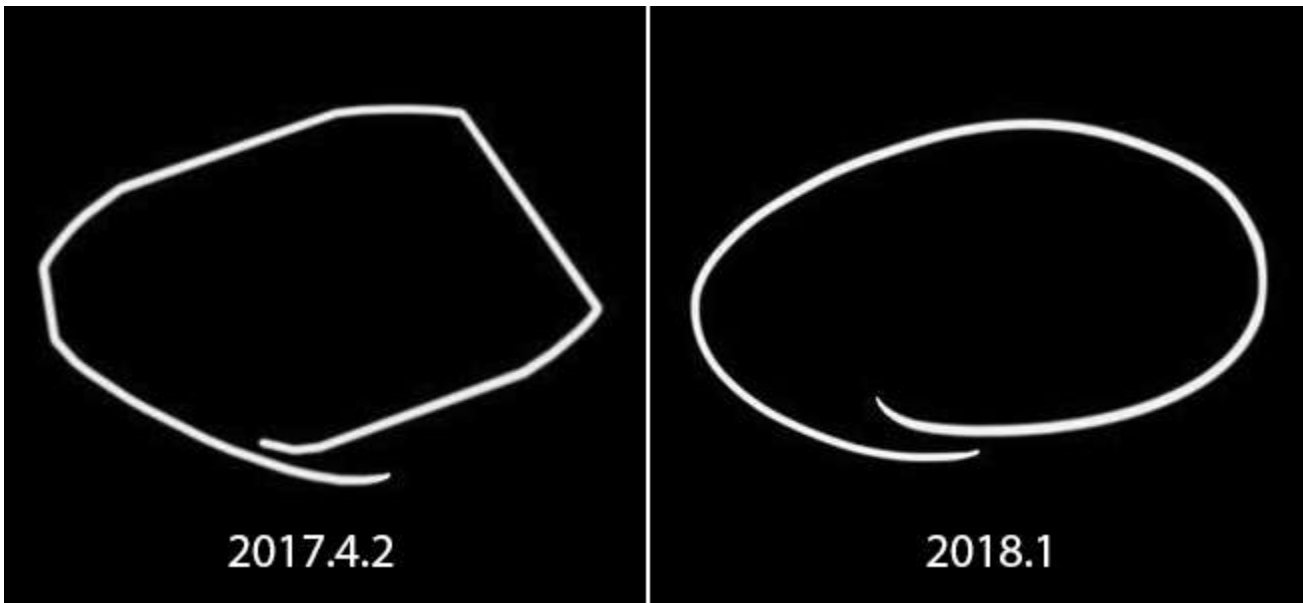
In this version we improved the way we handle Graphics tablet pen movements and inputs, especially when Substance Painter is under a heavy load.
We no longer lose the inputs anymore while we are doing consecutive computations. This should allow precise brush strokes in any situations.

Improved seam padding
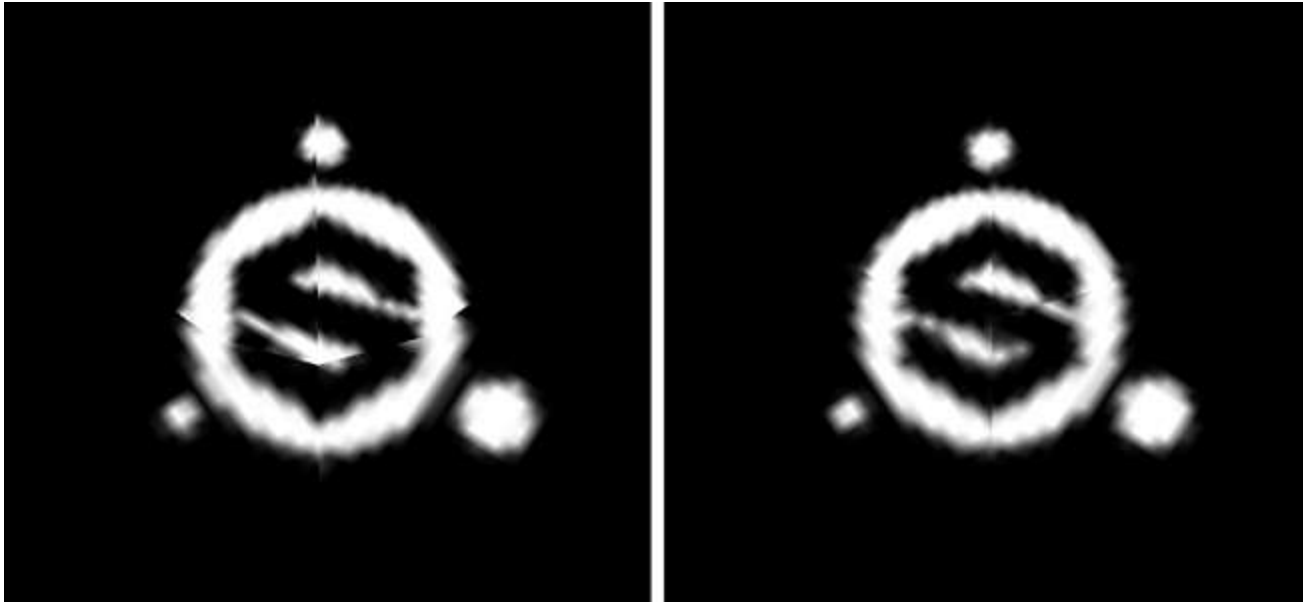
We reworked the way we generate our padding outside the UV islands. Instead of taking the current pixel and dilating it on a certain distance we now look for the neighboring pixel on the other side of the UV seam and interpolate the two values.
This gives a much better end result and reduce the visibility of the split between UV islands even when the textel ratios don't match.
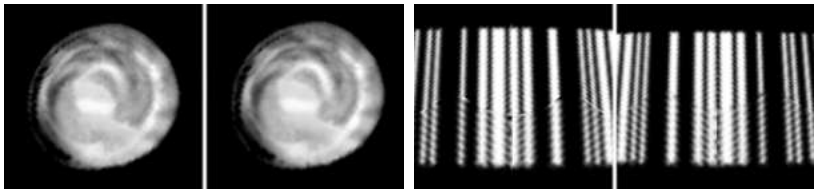
This new padding is automatically generated after each brush stroke, resolution change or layer modification.

Improved performances
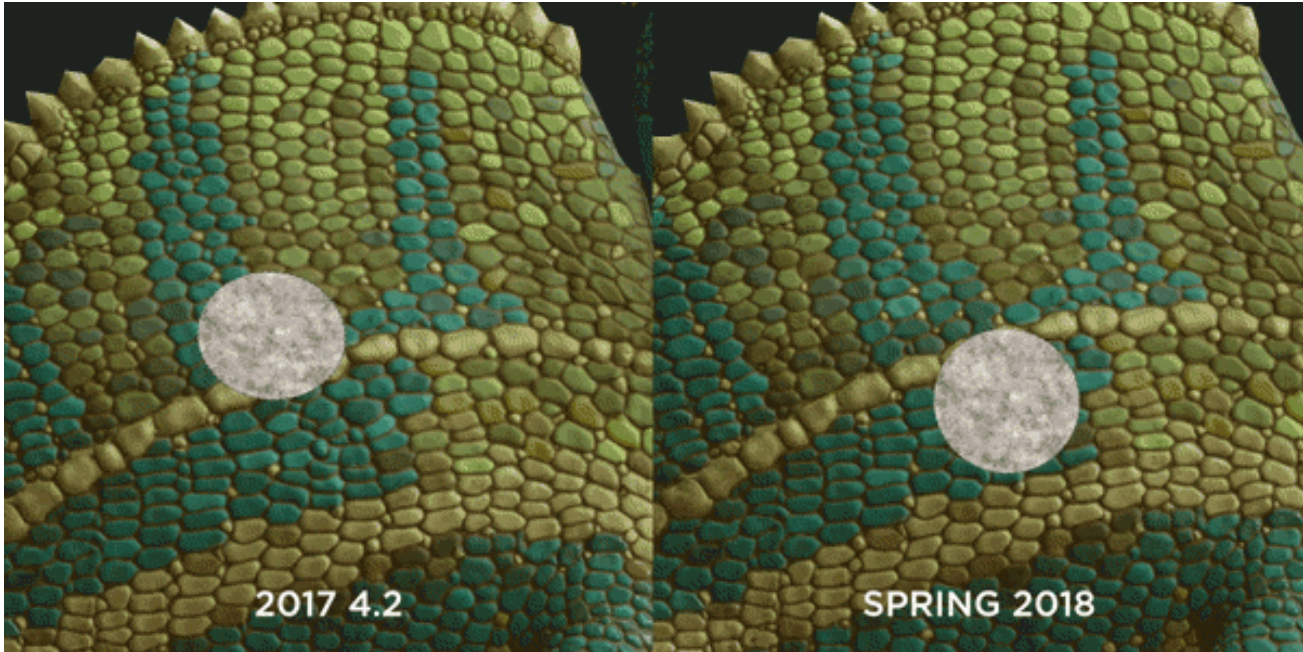
We also improved performances in this version on multiple levels :

- Opening and saving project should be a bit quicker than before.
  We reworked the way we encode/decode our **painting data**. This especially affect projects with a lot of paint information (brush strokes).

- We now support lot of **sub-objects** with meshes.
  It isn't mandatory anymore to merge a mesh into one piece before loading it in Substance Painter. Performance should stay good even with **8000 sub-objects** in a project.

- We changed the way our **viewport** is **refreshed** to reduce the load on the GPU when painting.
  This means we no longer update the whole image but instead a small region where you are currenlty working.
  You can feel the difference on less powerful GPUs or when using a high sample count in your shader.

- The **shelf** system is now **faster to discover** resources when launching the application.
  Substance materials with embeded bitmaps are **twice as fast** to discover (if cooked as non-solid). **Presets** should also see improvements.

Global scene position baker
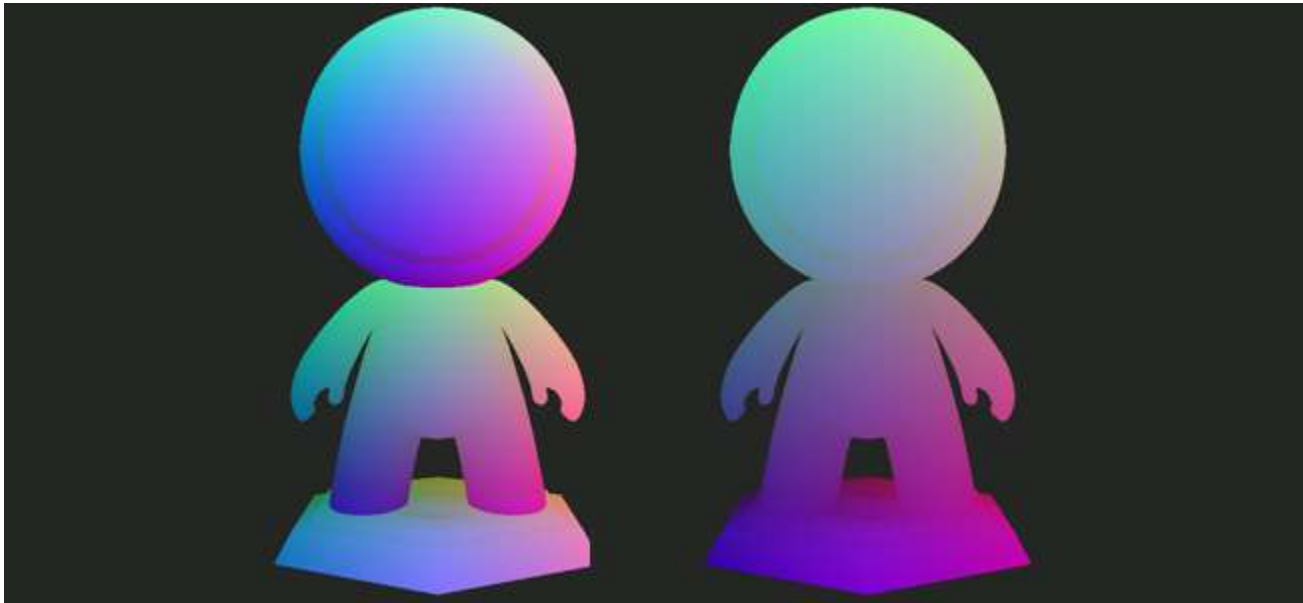
We now have a new setting that allows to bake a position map per Texture Set that take into account the full scene size.
This new behavior allows to use triplanar projections in Mask Generators that will match across the whole scene instead of creating seams like before. This is really usefull with projects that have a lot of Texture Sets (like UDIM based projects).

In the position baker settings, change the the parameter "**Normalization Scale**" from "**Per Material**" to "**Full Scene**" to enable this new behavior.

New content

3D Perlin Noise   3D Perlin Noise Fractal

3D Simplex Noise   3D Worley Noise
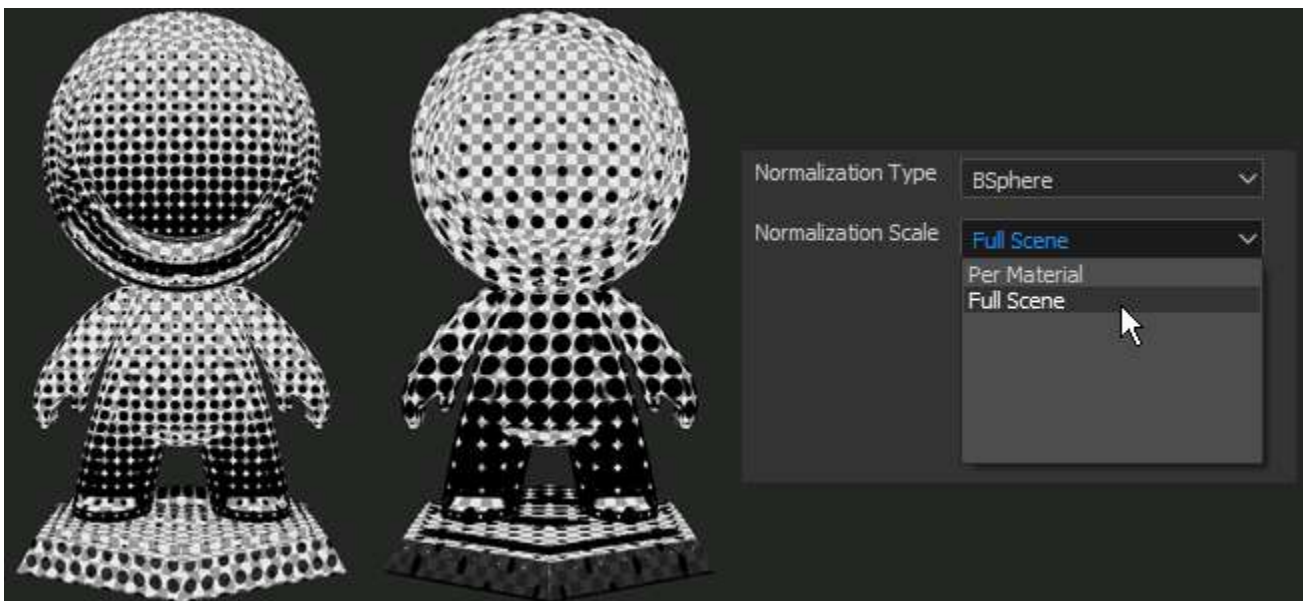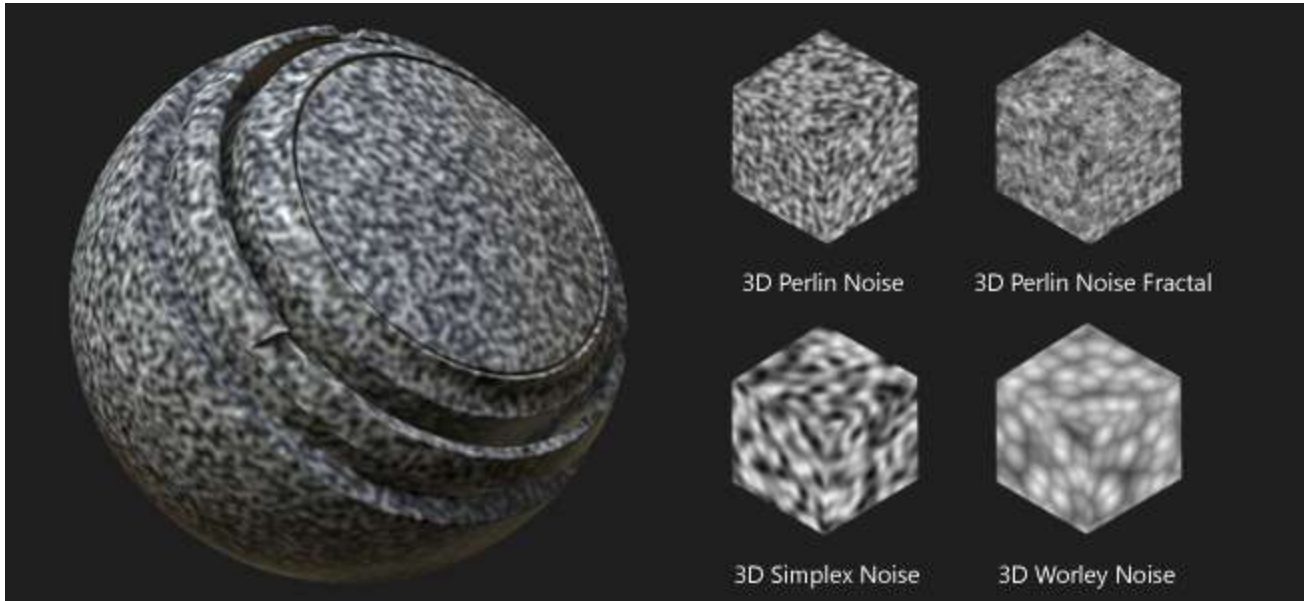
We also added some new content in this release :

- New **3D noises.**
  Imported direclty from Substance Designer, 4 new 3D and totally seamless noises have been added to the default shelf.
  These new noises rely on the posiiton map of the project to generate a result without any seams.

- **Non-square** noises
  The base noises have been updated to the latest version from Substance Designer.
  This means that the non-square expansion feature is now available in the noise parameters.

  > The 2D view still display non-square resolution as square at the moment.

- New mask generator **3D Linear Gradient.**
  This new mask generator allows you to create a linear gradient in any direction in 3D space.
  The direction can be defined with two 3D positions, which can be picked on the position map directly.
  <u>Example :</u>

  1. Create the mask generator **3D Linear gradient** in one of your layer
  2. Switch the viewport display to "**Position**" (via the viewport dropdown or by using the "**B**" key)
  3. Click on the "**3D Position Start**" parameter to open the **Color Picker** pop-up
  4. **Pick a color** on your mesh **in the viewport**
  5. Repeat the process for the second parameter "**3D Position End**"
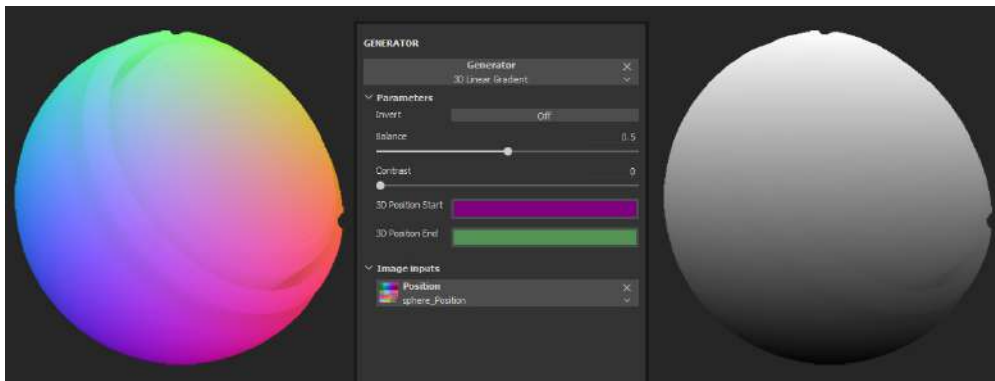
- New template **Lens-studio** (Snap Chat 3D app).
  We have a new template to easily create projects that target the Lens-Studio application created by Snap.
  A dedicated shader and export preset are also available. For more details about Lens Studio see : https://lensstudio.snapchat.com/

- **Smart Materials** and **Smart Masks** have been updated with the latest version of our Mask Generators.
  Our Smart presets now all support the **micro details** feature which can be used with **Anchor points**.

New sample project
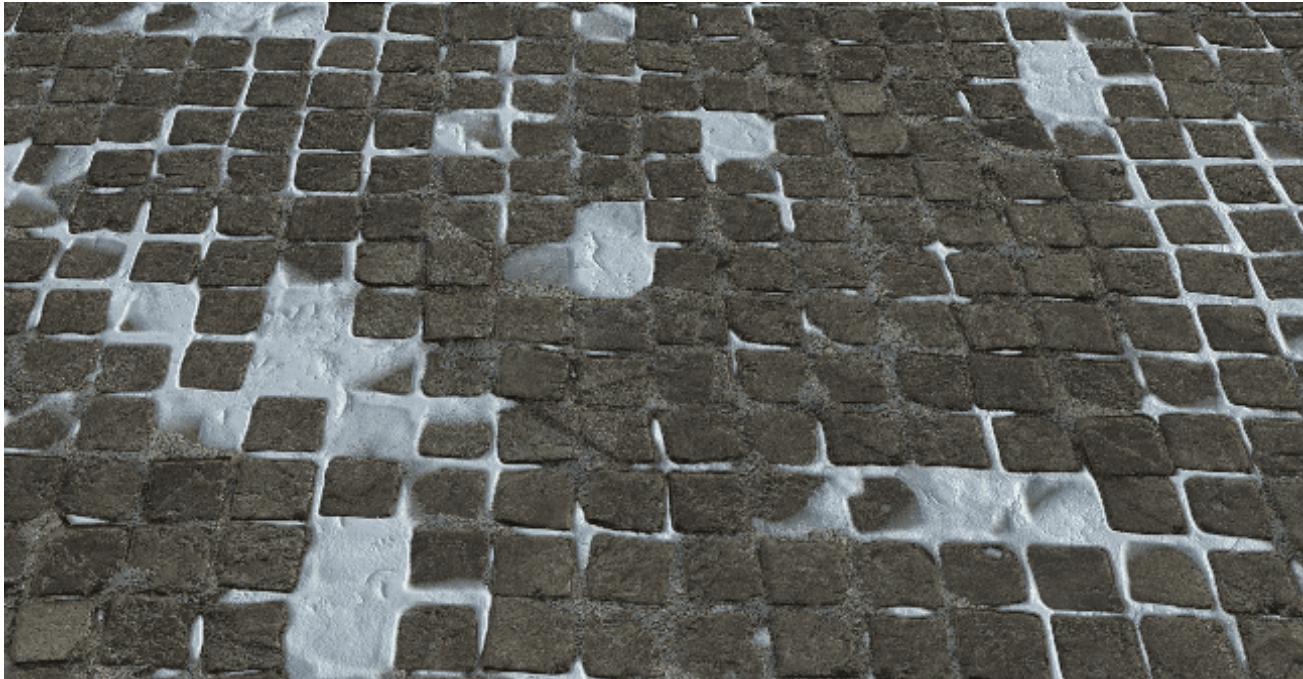
There is now a new sample project named "**TilingMaterial**" that you can open via the "**File > Open Sample**" menu action.
This project use a simple plane mesh with overlapping UVs which allows to **paint seamlessly** materials and brush strokes to **create tiling materials**.
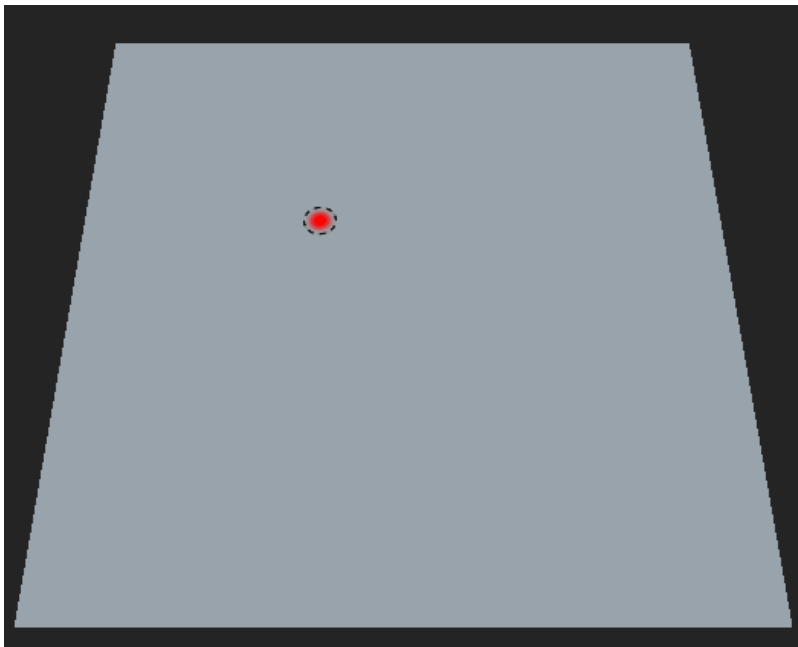
Tutorial

A new tutorial course has been added to Substance Academy to cover our new interface : Getting started with substance painter 2018

Release Notes

2018.1.2

(Released June 6, 2018)

Added:

- Summary: Improved Baking Speed, Improved Save System, Updated Sliders, Updated Plugin API, Chinese Translation, Improved Padding now Optional
- [Bakers] Performance improvement with new baker version
- Force display dialog with incompatible GPU
- [Save] Expose new compact project functionality (full/compact save mode)
- [Save] Inform user in case of saving error
- [Clean] Next save in full/compact mode
- [Sliders] Improvement of the precision of the color/grayscale bars and sliders
- [Sliders] Addition of Up/Down arrow controls
- [Sliders] Same detection zone for color and grayscale bar sliders
- [Plugin] Autosave always in incremental mode
- [Plugin] Option to switch plugins to new interface style
- [Language] Add Chinese translation
- [Padding] Option to switch between UV and 3D space neighbor padding per Texture Set in Texture Set Settings
- [Script] Expose save mode: full/compact or incremental
- [Script] Update scripting/QML documentation
- [Log] Indicate save mode in log (full/compact or incremental)

Fixed:

- [Tool] Channel slot transforms into a material slot on single-channel fills
- Crash when loading a mesh (FBX) with some faces not assigned by a material
- Crash in Iray with NVIDIA GRID 5.2 on virtual machine
- Crash when undoing a material preset deletion
- Crash when loading some projects
- [Command line] New command line for UDIMs meshes split-by-udim
- [Toolbar] Shrinking of the toolbar
- [Instancing] Cannot instantiate bitmaps across multiple texture sets
- [Viewport] Refresh is not complete when painting on mesh with tiled UVs
- [Iray] Normal Map is applied twice for dielectrics
- [Shelf] Typos in some Substance parameters (alphas, procedurals and matfx)
- [Shelf] Typo for the bitmap "Authorized Personnel Only"
- [Script] Function alg.shaders.materials() does not work anymore

Known Issues:

- Computation freeze on AMD VEGA GPUs

2018.1.1

(Released April 3, 2018)

Fixed:

- [Tablet] Issue when changing default interaction choices
- [Bakers] Crash with Assimp library
- [Bakers] Regression on performance with A.O. map
- [Iray] Lens Distortion is not applied to the Alpha channel
- [Drivers] Update of minimum drivers requirements
- [3Dview] Normals not correctly generated on UDIM meshes without normals information
- [Intel] Crash with Substance Painter 2018.1.0
- [Intel][Viewport] Issue with padding (black artefacts)

Known Issues:

- Computation freeze on AMD VEGA GPUs

2018.1

(Released March 15, 2018)

Added:

- New overall style (icons, color, behavior)
- New default layout
- [Tablet] User experience enhancement while painting
- [Main menu] Sort native items in views and toolbars first
- [Main menu] Move quick mask actions in viewport section
- [Main menu] Move right-click actions into viewport section
- [Main menu] Rename "View" menu as "Window"
- [Quick menu] New tool properties by right click in viewport
- [Dock widget] New dock toolbar for quick reduce/recall
- [Display settings] Camera and viewer settings window merged
- [Layer stack] Contextual right click menu
- [Layer stack] Drag and drop to move any effect within the same layer
- [Toolbar] Reorganization of toolbar and new contextual toolbar
- [Tools toolbar] Split clone tool into two separate tools
- [Tools properties] Lighter background grayscale value in the preview
- [Tools properties] Organization in tabs (fill and tools)
- [Tool] Painting result matches the stencil
- [Viewport] New cursor for fill layer
- [Viewport] Smoother navigation and painting (higher frame rate)
- [Viewport] Material/Channel/Map selection combobox in viewport
- [Viewport] Reduce flickering while rotating (shadow on)
- [Shelf] Display materials by default when opening Painter
- [Shelf] Loading time improvement of Substance textures and materials (2 to 6 times faster)
- [Shelf] Reorganize materials folders to fit Substance Source structure
- [Shelf] Drag and drop materials directly on the mesh in the viewport
- [Shelf] New 3D Noises (Perlin, Perlin Fractal, Simplex and Worley)
- [Shelf] New 3D Linear Gradient mask generator using mesh position
- [Shelf] Updated base Noises to support non square expansion
- [Shelf] Added new template and export preset for Lens Studio (Snap application)
- [Shelf] Updated Smart Materials and Smart Masks to use latest version of the Mask Editor (micro details)
- [Shelf] New sample project "TilingMaterial" to create seamless tiling materials
- [Shelf] New brush presets (Calligraphy, Wet, Hatching and so on)
- [Sliders] New sliders and grayscale/color bars style and behavior
- [Bakers] Allow use of full scene bounding box to compute the position map
- [Shader] Remove height force parameter from the default shader parameters
- [Engine] Substance engine updated
- [Engine] No or less discontinuities across UV chunks (new seam padding)
- [Plugins] Import materials downloaded from Substance Source more quickly
- [Plugins] Update all plugins to match new overall style
- [Preferences] Preview background color changes automatically
- [Clean] Reduced risk of project corruption
- [Open] Opening project time improvement
- [New project] New project - mesh update time improvement
- [Save] Saving Project time improvement
- [Log] License type reported in log
- [TextureSet] Rename "Bake Textures" button as "Bake Mesh Maps"
- Rename "Additional maps" as "Mesh maps"

Fixed:

- [Viewport] Bad performances with meshes containing a lot of sub-objects
- [Tools properties] Channel disabled when dragging and dropping an image into the material slot
- [Tools properties] Brush preview is broken with smudge and clone tools
- [Texture set] Channels order is wrong when using templates
- [Shelf] Missing icon for Grayscale Conversion generator
- [Shelf] Sign Circle Number alpha is broken (missing font)
- Incorrect detection of integrated GPUs at launch
- [Crash] Drag-and-droping an imported ressource named with a # character
- [Engine] Vram detection issue on integrated GPU
- [Engine] Fixed numerous crashes in Substance Engine Linker
- [Engine] Square artefacts when changing resolution
- [Post Effects] Interface resize is slow when post effects are on
- [Bakers] Scene unit is not correctly respected for Ray Distance values
- [Bakers] AO from Mesh Occluder distance is clamped to 1 no matter the input value
- [Bakers] Match by name ignores some meshes with specific names
- [Bakers] Color from mesh Polygroup and Submesh ID setting always return a black image
- [Bakers] ID Baking fails with binary FBX meshes from Blender
- [Shader] Noise in the 2D View with dota-2 and non-pbr-spec-gloss
- [Linux] Only one CPU thread is used when baking
- [MacOS] Crash with brush cursor moving over the viewport

Known Issues:

- Computation freeze on AMD VEGA GPUs

- Distorsion post process not taken into account while exporting in IRay (alpha channel)

Version 2017.4

Substance Painter 2017.4 add a new workflow feature with the **layer instancing** allowing to easily synchronize layers across different Texture Sets inside a project.

Release date : *23 November 2017*

Major Features

Layer Instancing
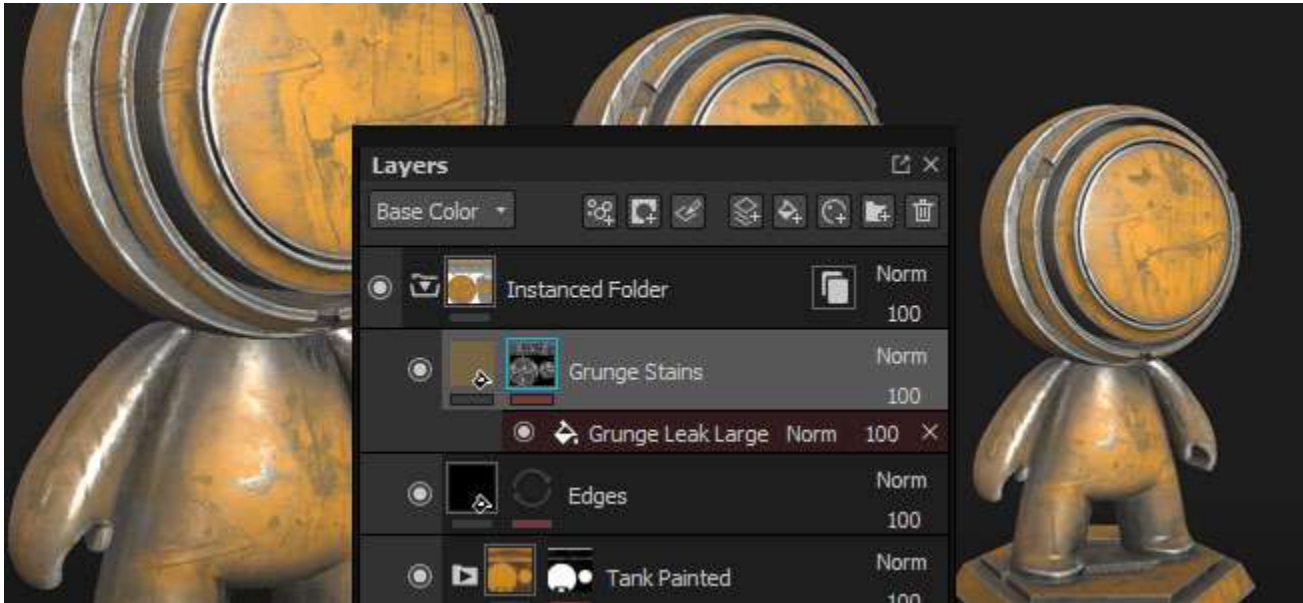
The **layer instancing** is a new system that allows to keep **synchronized** layer **parameters** across **other layers and Texture Sets**. When creating a layer instance the original layer becomes the **source** and the instances will **stay updated** unless the link between them is broken. Instanced layers are a **great way** to **texture an asset in a few clicks** and avoid doing back and forth to update layers. To easily texture an asset, simply **instantiate a folder** across other Texture Sets and put a smart material or any other layer into it, it will be **replicated everywhere** instantly.

There are two ways to create an instance :

- Choose "**paste as instance**" (or use the shortcut CTRL+SHIFT+V), after copying a layer
- Choose "**instantiate across texture sets**" (or use the shortcut CTRL+SHIFT+D) after selection one layer

> There are some limitation related to the layer instancing :
>
> - Any painting actions will only be present on the source layer, instanced layers won't replicate brush strokes.
> - Anchor's references must have the anchor point at the same level of the instance, an anchor point can't be outside of an instanced folder otherwise it will be broken.
> - If a smart material is saved with instanced layers, the source layer must be in the smart material folder otherwise the instance link will be broken.
> - Depending of the layer stack setup, instanced layers can create a cycle, which is not supported and will break the instance result. Either delete or move the instance to fix it.

For more details and examples, see the dedicated page : Layer Instancing

DCC Live-link with Unreal Engine 4 support
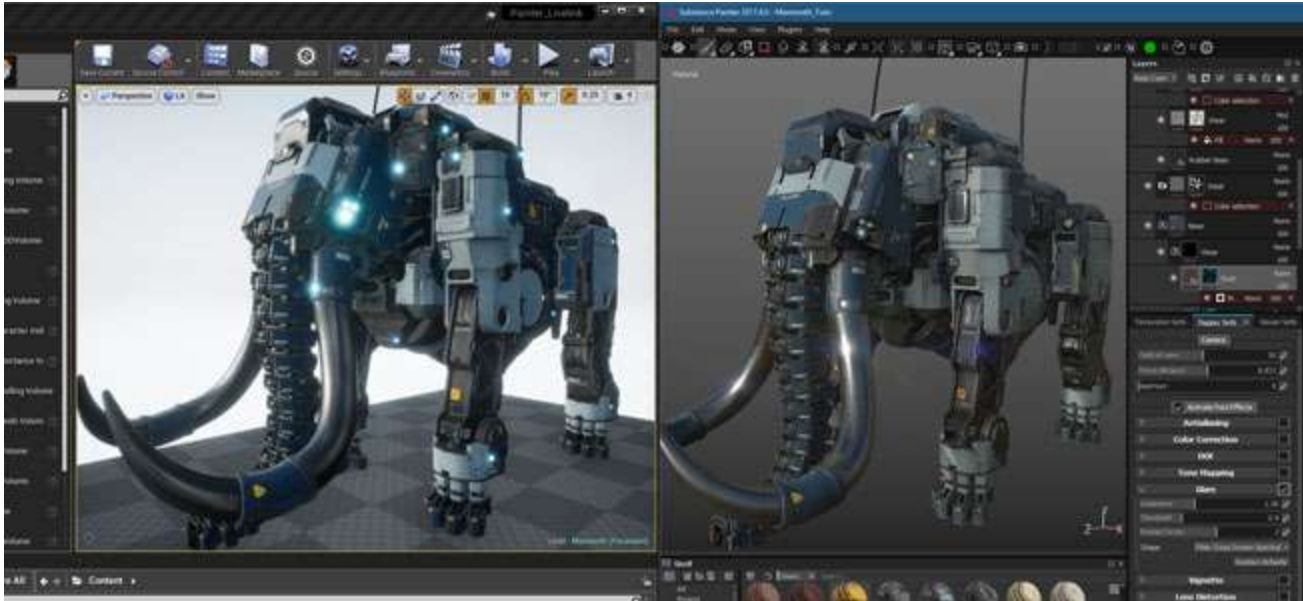
The previously beta version of our **live-link plugin** has now been **integrated** in Substance Painter. We took the occasion to support the Unreal Engine 4 which now allows to see the result of a project into the engine automatically.

To connect the application with the **Unreal Engine 4** (version **4.18** minimum required), download the Substance plugins over here : https://www.unrealengine.com/marketplace/substance-plugin

New shelf content

We added **20 new procedural materials** and also added **40 new grunge maps** (with some of them being procedural). The new materials can be found in the "**Materials**" section of the **shelf**, such as the 6 new metals, the 8 new plastics, a few fabrics and 2 new wood surfaces. The new grunge maps can be found directly in the "**Grunge**" section of the **shelf**.
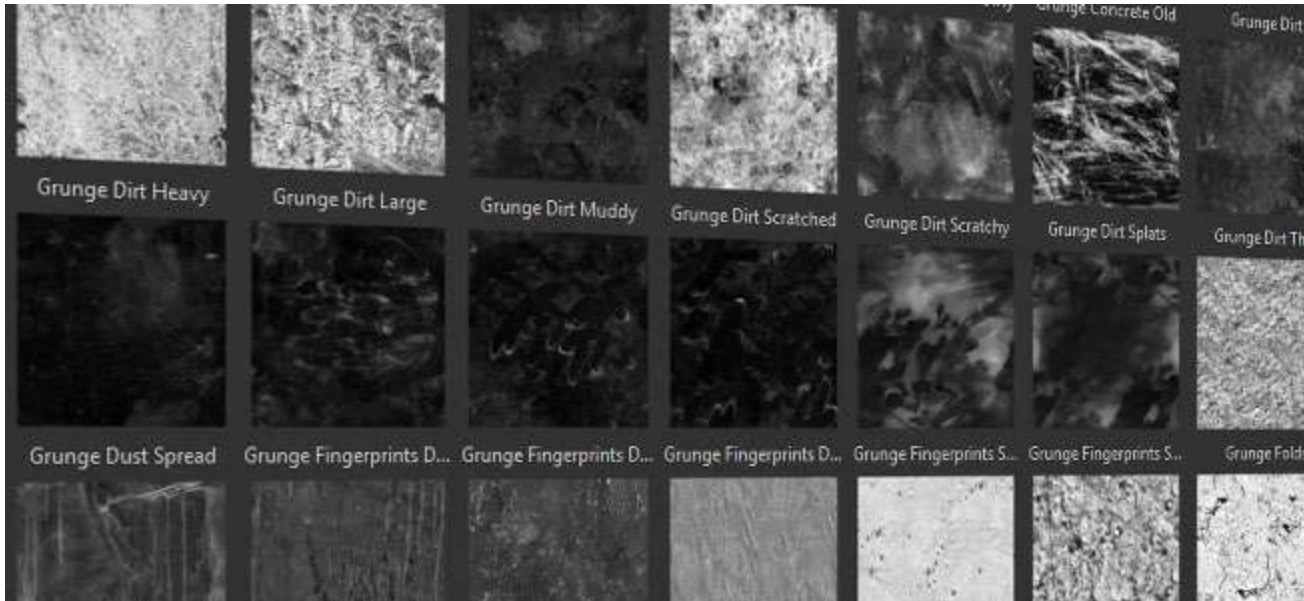
Many thanks to Clément Feuillet and Nicolas Longchamps for allowing us to license their content for this new version.

Sketchfab export improved

We updated our Sketchfab export and added the ability to publish your project as a draft and even update already uploaded projects. It should make project iterations much easier to do.

Performance improvements

We continued our work regarding performances improvements. In this new version we reworked quite a lot of our OpenGL rendering in the viewports which should give a nice speed boost. We also improved the way brush strokes are computed and they should require much less bigger texture computations in memory. Overall it will give much faster results and better painting sensations.

Tutorial

The new features are covered in details in our latest videos :

Release Notes

2017.4.2

(Released January 24, 2018)

Added:

- [Export] Get the status of an export with step progress
- [Export] Allow cancelling an export
- [Export] Export textures to Sketchfab without loosing normal map quality
- [Export] Export in glTF binary format (glb)
- [Export] Allow resizing columns in configuration tab of the export window
- [Shader] Add a changelog for the shader API
- [Scripting] Add Before and After callback functions when exporting textures
- [Iray] Upgrade to SDK 2017.1 (support of Volta GPUs)

Fixed:

- Crash when quitting the application before the main window is displayed
- [MAC] Crash when loading grayscale maps with IRAY
- [MAC] VRAM detection is not correct with the new High Sierra OS
- [Plugin] Downloading assets from Substance Source does not work anymore
- [Scripting] Incorrect minimum plugin version detection
- [Export] Fail to save export preset after exporting textures
- [Instancing] Issue on generators instantiated in a TextureSet with no Additional Maps
- [Viewport] Dithering does not work with resolution above 4k
- [Viewport] 2D View material display is covered with noise
- [Shelf] Improve loading time for shelf presets
- [Engine] Incorrect blending when painting under color selection

2017.4.1

(Released December 15, 2017)

Added:

- [Scripting] Export mesh through the scripting API
- [Import] Disable import of unsupported mesh file format (allow only obj, fbx, dae, ply)
- [Log] Indicate more precisely the TDR issue in the log file

Fixed:

- Crash if application is closed before resources crawling has finished
- Crash when opening projects with Smudge/Clone tool
- Crash when using redo after an undo of a Shader change in Viewer Settings
- [Engine] Texturing differs between Painter 2017.2 and 2017.4
- [Viewport] Picking on an ID map from an instance samples the wrong color
- [Export] Crash when exporting an invalid normal or occlusion texture
- [Export] PSD files have their groups locked when opened in Photoshop CS6
- [Plugin] Photoshop plugin ignores channel selection and always export everything
- [Layers] Anchors break when copy/pasted across Texture Sets
- [Layers] Some anchor's references cannot be restored if broken
- [Shader] pbr-coated secondary roughness parameter is broken
- [Steam] Version checker pop-up shouldn't be visible at launch

Known issues:

- [AMD] Crashes/Freezes when trying to paint on a mesh. Can be fixed with a GPU Driver update.

2017.4

(Released November 23, 2017)

Added:

- [Instancing] Allow to instantiate parameters across layers
- [Instancing] Allow to jump between a source layer and an instance
- [Instancing] Add a "instantiate across texture sets" action
- [Instancing] Indicate in the layer stack re-entrant instances (cycles)
- [Instancing] Delete instances when a source is removed
- [Instancing] Don't allow Anchor's references from outside an instanced folder
- [UI] Move the Undo Stack into its own window named "History"
- [Plugin] Integrate DCC live-link plugin

- [Engine] Improve painting performances with Sparse painting
- [Export] Add draft and re-export options to Sketchfab exporter
- [Shelf] Add "flip" control for Font substances
- [Shelf] Add 20 new procedurals materials
- [Shelf] Add 40 new grunges maps (bitmap based and procedural)
- [Viewport] Enable brush preview collisions on other visible texture sets
- Update AMD GPU drivers minimum requirements

Fixed:

- Crash When computing Substances at too big resolutions
- Crash when painting heavily with particles
- [Viewport] Incorrect specular reflection in the 2D view with specific meshes
- [UI] Some unwanted actions appear into the History window

Known issues:

- [Layers] Some anchor's references cannot be restored if broken
- Crash when using redo after an undo of a Shader change in Viewer Settings

Version 2017.3

Substance Painter 2017.3 focus on new advanced export preset with the support of **Adobe Project Felix** and the open format **glTF**. This new release also focus on the user experience by improving the interface and adding an autosave plugin.

Release date : *28 September 2017*

Major Features

Adobe Standard Material export preset

One of the new exporter we include in this release is the support of the Adobe Standard Material, to be used with Adobe Dimension (previously Adobe Project Felix). We let you export the scene mesh and its textures to be imported into Project Felix in one click. To access it, simply choose "**Adobe Standard Material**" in the export textures window. For more information, see : http://www.adobe.com/products/dimension.html

You can also check out our blog post about it : https://www.allegorithmic.com/blog/new-dimension-substance-ecosystem

glTF 2.0 export preset

We also added support for the **glTF** file format, with the export of the **scene mesh** and the **PBR textures** (metallic/roughness). To access it, simply choose "**glTF PBR Metal Roughness**" in the export textures window. **glTF** is an open-source file format directed by the Khronos group. You can view your glTF file from within **Windows 10** or simply use a WebGL viewer such as **Babylon**.

For more information, see : https://github.com/KhronosGroup/glTF

Autosave plugin
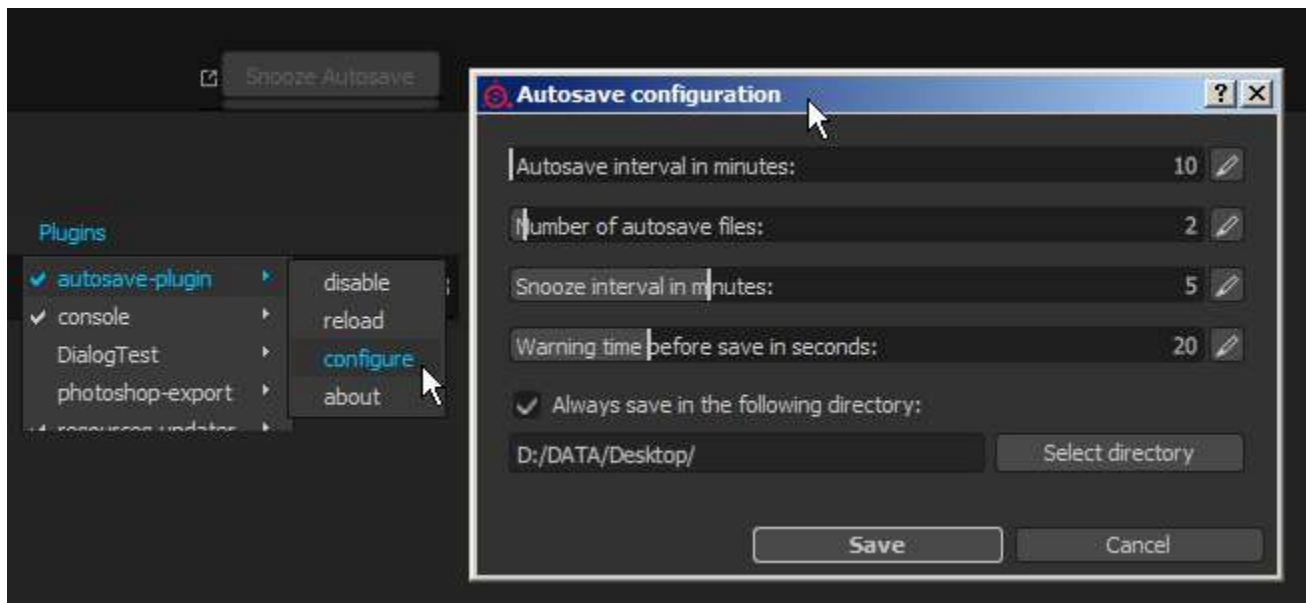
In this release we also included a new plug-in that has the possibility to **create backups** of the currently opened project. It creates a backup file on the side of the currently opened project.
Because of this, we also added a "**Save As Copy**" entry in the File menu. The **autosave** can be stopped by disabling the plugin itself, its **settings** can be accessed **via the configure panel**. When the delay of the warning time is reached, a **progress bar** will appear below the button in the main toolbar, allowing to snooze it for a few minutes if needed (handy if you want to finish something before the backup).

If a backup is created but the project has not been saved (aka Untilted), the backup will be stored inside the **Documents/Allegorithmic /Substance Painter/autosave** folder. Otherwise, the backup will be next to the project itself (unless the path is overridden by the configuration panel).

Improved gradient filter
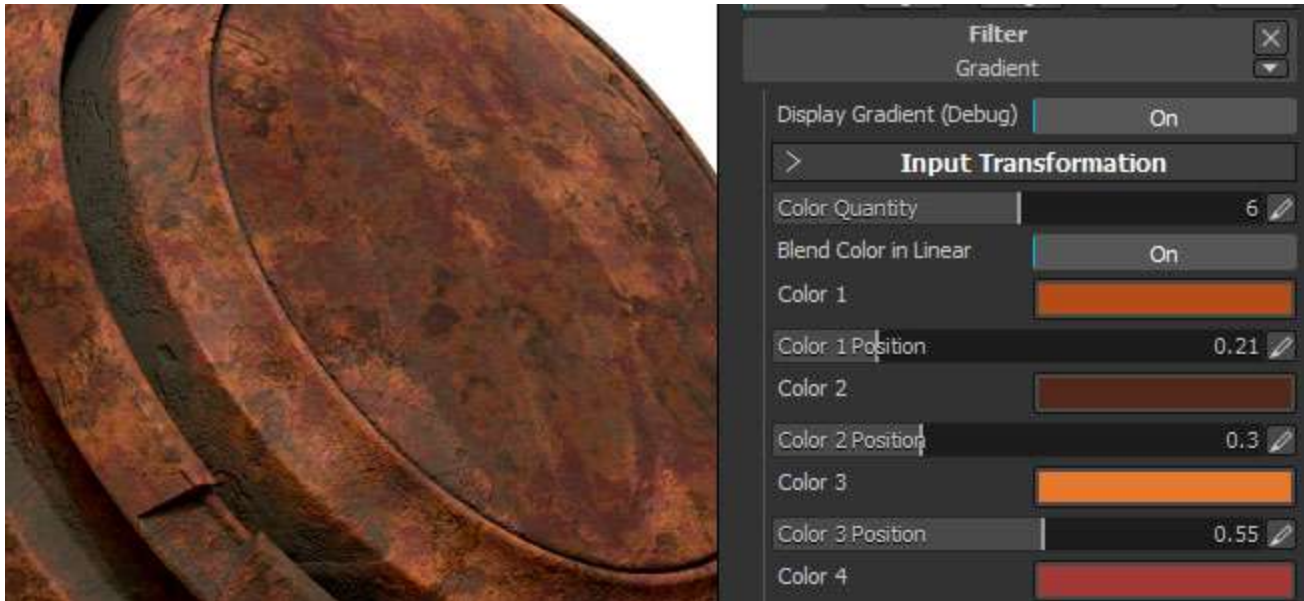
The **gradient filter** has been completely revamped. Acting in a much more similar way to the **gradient map** node available in **Substance Designer**. It now supports up to **10 different colors**, with the possibility to specify **where the color is located inside the gradient**, opening a lot of new doors. This allows to create more **advanced color patterns** but also to **remap heigh maps** and create **new shapes**.

The main slider (color quantity) defines the number of total color that are used to create the gradient. The button just below defines the color blending mode (sRGB or Linear). This is important if you want to have a proper blending between colors. For example blending a pure red and a pure green should give a nice yellow in-between. This won't be the case if the button is disabled (it will give a dark brown instead). When remapping the height or any other grayscale channels this button should be disabled to avoid doing the gamma conversion.

The button on top allow to replace the result of the filter with the gradient itself, to visualize the gradient in the 2D view.

Interface and behavior improvements
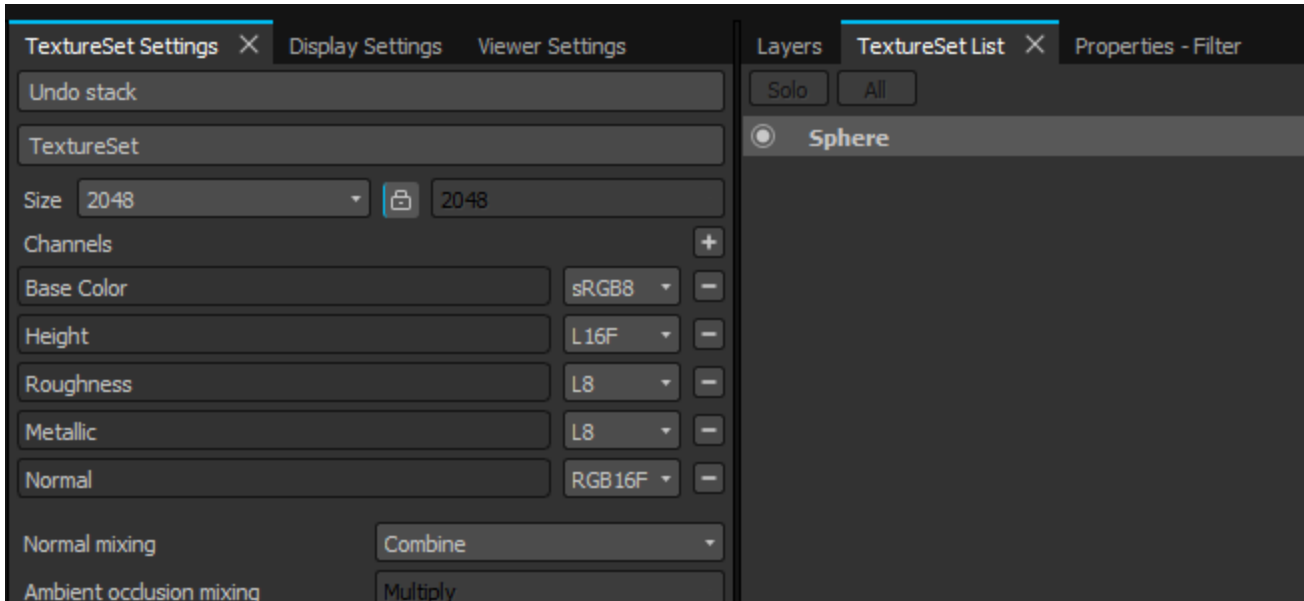
In this release the **tabs** of the different docks of the application are now located **on the top instead of the bottom** of their respective windows. This choice was made to help the readability of the interface but also to be more consistant with other application. Following this change is the introduction of the **little cross** next to the tab title to **easily close it**. It is also possible to **right-click** on the tab to bring a **context menu** (that allow to close or undock the window). A shortcut to undock the window is to simply drag and drop the tab outside of the window area.

It is now also possible to **open projects** by simply drag and dropping them **into the viewport** from the file explorer. This also works with **mesh** files : drag and dropping a mesh file in an **empty viewport** will open the **new project window**, but doing it on an **already open project** will open the **project configuration dialog**, allowing to quickly **update a mesh**.

Note : if you have issus with the drag and drop, be sure to check our FAQ on the subject.

Performance improvements

This version of Substance Painter also include a new and strong performance improvement regarding the way we manage the GPU memory (VRam). Uniform colors (such as fill layers) are now compressed into smaller textures, accelrating their transfert between the main memory and the GPU memory but also reducing their memory footprint and their computation time. This should be especially visible when opening huge projects and when reaching the limits of the GPU memory.

Release Notes

2017.3.3

(Released 01 December 2017)

Fixed :

- [Steam] Version checker pop-up shouldn't be visible at launch
- [Export] PSD files have their groups locked when opened in Photoshop CS6

2017.3.2

(Released 20 November 2017)

Added :

- [UI] Improve new version dialog and add changelog
- [UI] Indicate if maintenance is expired in new version dialog
- [License] Update license system to handle Maintenance dates
- [Export] Rename Adobe Standard Material to Adobe Dimension

Fixed :

- [Mac] Painting leads to black squares and texture corruptions
- [Engine] Cache can sometimes disappear in the Viewport
- [Engine] Blocky artifacts appear when memory compression trigger
- [Baking] Strange error messages when baking specific meshes

- [Export] PSD are incorrectly written and are not recognized properly by Photoshop
- [Layers] It shouldn't be possible to copy/paste layer across multiple projects
- [Substance] UserData color space for Normal input is flipped in some cases
- [Shelf] Micro-normal in generators outputs inverted curvature
- [Shelf] HSL filter also affect alpha channel
- [Linux] Installation on Centos fails because of missing dependencies
- Installer doesn't remove all resources from previous install in certain cases

2017.3.1

(Released 26 October 2017)

Added :

- [Export] Allow to export the mesh from a project
- [Shelf] Remove "Sub-Shelf" from the tabs titles
- Save post-process settings in templates
- Make the TDR message more understandable
- Improve Settings window to report errors

Fixed :

- Crash when deleting several sub-shelves
- Crash when switching from a level to something else during an engine computation
- [Mac] Crash on Intel GPU during engine computations
- [Mac][Viewport] Bad performances when dithering is enabled
- [Mac] MacOS 10.13 is recognized as "Unknown version" in the log file
- [Baker] Baking with a cage doesn't work anymore
- [Layers] Ctrl + C shortcut (copy action) doesn't work anymore
- [Layers] Pasting layers doesn't refresh UI with anchor's references
- [Anchor] Duplicate or Copy/Paste Layer with References breaks links
- [Export] 8K export can crash or deadlock application in some cases
- [Export] Multiple issues in generated glTF file format
- [Import] Re-importing a mesh with the same filename doesn't work anymore
- [Plugin] Auto-save window always appear on top of everything
- [UI] Infinite loop when you Press "Escape" on the TDR Dialog
- [UI] Reset UI display a second title bar on the shelf window

2017.3

(Released 28 September 2017)

Added :

- [Export] Allow to export mesh and textures for Adobe Project Felix
- [Export] Allow to export into glTF file format
- [Engine] Optimize textures size in VRAM by using block compression
- [Viewport] Be able to drag and drop a mesh or project in the viewport
- [UI] Improve warning message about TDR
- [UI] Log should be displayed only upon request
- [UI] Allow to clear the content of the log window
- [UI] Display warnings and errors in the status bar
- [UI] Display Tabs on top as in web browsers
- [UI] Improve "not paintable" context and messages
- [UI] Add a "save as copy" action in the file menu
- [Layer] Set default tiling setting to 1 by default
- [Shelf] Improved gradient filter to support 10 dynamic colors
- [Shelf] Add a space in the default query of the mini-shelf
- [Shelf] Add a 'Open in explorer' action for local resources in the shelf
- [Shelf] Add template and shader for Adobe Material Standard (Project Felix)
- [Shelf] Increase max tiling to 128 in Material Layering shaders
- [Shelf] Added sobel curvature for micro-details of Mask Generators
- [Plugin] Add autosave plugin with customizable time interval
- [Scripting] Add a "save as copy" function

Fixed :

- [UI] Layout is broken at the first launch
- [Export] PSD generated at export has format errors
- [Export] EXR always exports 8 bits height map
- [Export] Crash when exporting corrupted Additional maps
- [Import] Hard edges are not preserved on low poly meshes in some cases
- [Import] Improved error messages when importing meshes with issues
- [Bakers] ID Map Baking fail with Match By Name enabled

- [Viewport] Tangent space is not synched with bakers
- [Effect] Moving back a layer doesn't restore an anchor's reference
- [Effect] Refresh issue when creating a link in between two Masks with anchors
- [Effect] Masks anchors above mask shouldn't be listed
- [Effect] Extract Alpha setting from Anchors doesn't work
- [Engine] Mask inverts itself after first brush stroke
- [Engine] Crash when switching Texture Set on specific project
- [Shelf] Crash when deleting a preset which is in a project
- [Shelf] Typo in advanced Tri-Planar filter
- [Shelf] MG Mask Builder AO Noise Scale doesn't work properly
- [Shelf] MG Mask Builder has inverted curvature parameters
- [Shelf] Imported alphas generate a material sphere preview instead of a flat one

Version 2017.2

Substance Painter 2017.2 introduces a new powerful feature via the Anchor point system. It allows to create more advanced configurations in the layer stack which opens up a lot of new possibilities.

Release date : *27 July 2017*

Major Features

New Anchor point effect

A new effect type has been added to Substance Painter, next to the already existing such as **Filter** and **Level** you can now find the new **Anchor point**. This new effect allow to define a **location** in the **layer stack** that can then be **referenced** across the rest of the project in any other layers. This allow for example to use the height information from a layer into the mask of a layer just above this one, allowing a more natural blending (as illustrated by the gif above).

Because the Anchor works as an effect, in can be created in **many situations** : the **content** of a layer, the **mask** and even as a **pass-through** filter. The effect also work even if the layer where it is located is disabled. Note that the Anchor define only a location, not what you can retrieve from it. This information is defined where the reference to the anchor is created.

For more technical details and examples, see the dedicated page : Anchor Point

New various improvements

Alongside the new Anchor point effect, we also worked on :

- The ability to rename some effects, such as the Fill and Paint
- New scripting functions, allowing to create a live-link with other applications such as Unity

Tutorial

The new features are covered in details in our latest videos :

|

Release Notes

2017.2

(Released 27 July 2017)

Added :

- [Effect] New Anchor Point that allow layer and mask referencing
- [Layers] Ability to rename Fill and Paint Effects
- [Plugin] Updated Substance Source plugin
- [Scripting] Allow to query Texture Set Resolution
- [Scripting] Allow to get the status of the Painting engine
- [Performance] Improved project loading and brush stamping optimizations

Fixed :

- [Tool] Performance issues when tweaking material parameters
- [Engine] Disappearing brush strokes when changing resolution (4K>2K)
- [3D View] Tangent space is not synched with bakers
- [Shelf] Shelf path in the user documents isn't created automatically
- [Shelf] Make presets compatible with previous versions after an update
- [Shader] Non-PBR shader doesn't work anymore
- [Bakers] ID Map Baking fail with Match By Name enabled
- [Sample] Meet Mat sample project Texture Set names are incorrect
- Saving a project before creating a template returns write permission errors

Version 2017.1

Substance Painter changes its versioning number following the new Substance offer. For more details check out : https://www.allegorithmic.com/welcome-to-substance
In this new version we wanted to focus on the content by providing a new plugin that allow to browse Substance Source and import materials directly into the shelf. We also added a lot of new assets to expand your creative possibilities.

Release Date : *20 June 2017*

Major Features

New plugin : Substance Source
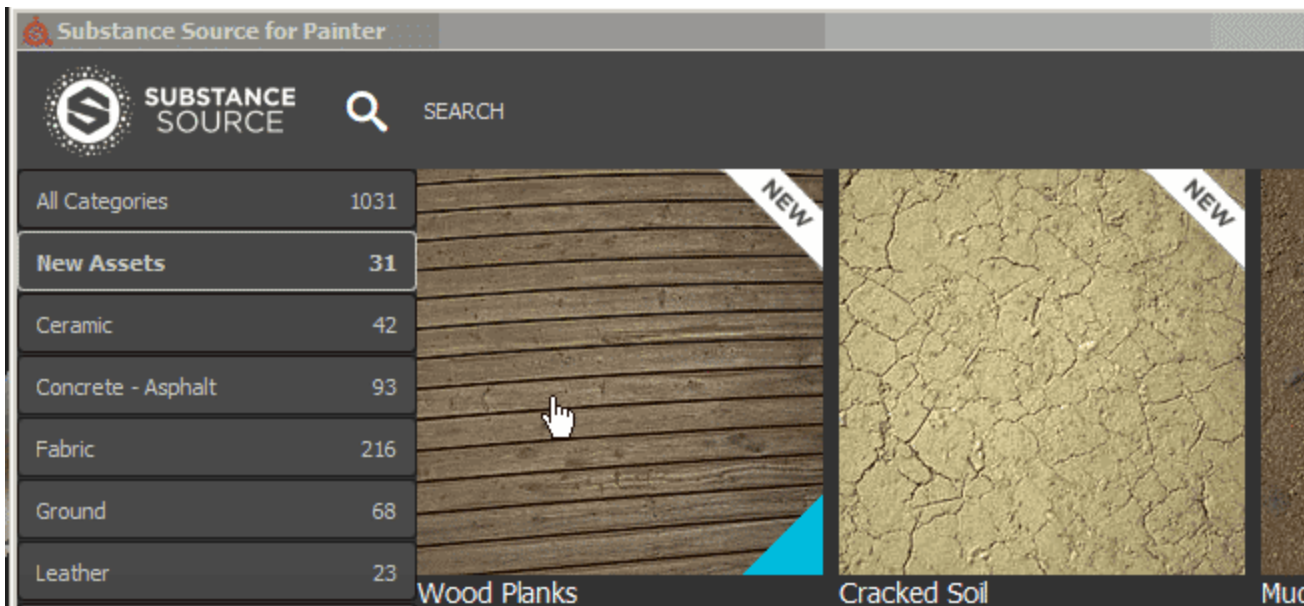
With this new plugin it is now possible to **directly browse** our database of materials called **Substance Source** and download them **directly into the shelf**, ready to use and ready to work in your projects.

To open Substance Source, simply click on the Substance Source logo **in the main toolbar** of the application. This should open a new window allowing to browse the library.
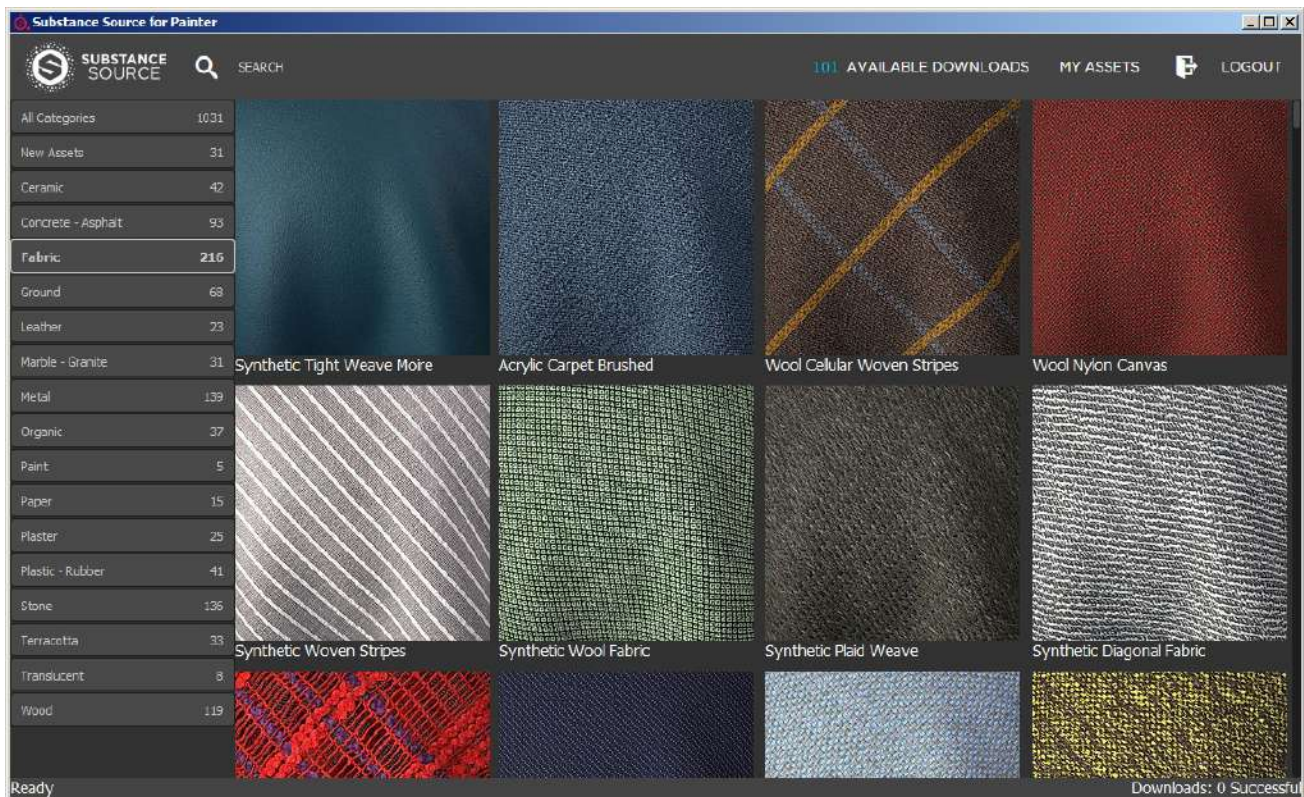
New content : Alphas, Procedurals, Filters and more

In this new version we are adding **more than 300 new assets**. We added **sci-fi**, **geometric**, **medieval**, or even **Celtic** themed content in the alphas. It also includes a lot of **new brushes** and **scanned handprints/fingerprints**. We also provide some handy new filters such as the **MatFX Detail Edge Wear** which allow to generate **scratches** directly **from the normal information** painted on your mesh.

Here is the list of the new content :

- **4 New Fonts** (Japanese, Simplified Chinese, Typewriter, Segment)
- **230 New Alphas** (Mix of patterns and scanned images)
- **50 New Procedurals** (Mostly Fabric pattern for medieval and contemporary clothing)
- **2 New environment maps** (Mondarrain and Villa Nova Street)
- **9 New filters** (MatFX Detail Edge Wear, Clamp, HBAO, etc.)

We also updated some of the existing assets to make them work better, such as the **default environment map** which now look **less yellow :**

Tutorial

The new content is covered in our latest video tutorial :

Release Notes

2017.1

(Released 20 June 2017)

Added :

- [Plugin] New Substance Source plugin (allow to download assets in the shelf)
- [Shelf] 4 New Fonts (Japanese + Simplified Chinese, Typewriter, Segment)
- [Shelf] 230 New Alphas (Mix of patterns, brushes and fingerprint scans)
- [Shelf] 50 New Procedurals (Fabric patterns of medieval and contemporary clothing)
- [Shelf] 2 New environment maps (Mondarrain and Villa Nova Street)

- [Shelf] 9 New filters (MatFx Detail Edge Wear, Clamp, HBAO, etc.)
- [Shelf] Improved default Panorama environment map
- [Shelf] New Arnold 5 export presets
- [Scripting] Allow to import resource into the Shelf

Known Issue :

- [Export] Editing an export preset is very slow

Old versions

Version 2.2

Substance Painter 2.2 adds a new workflow which si the Dynamic Material Layering.

Release date : *21 July 2016*

Major Features

New Dynamic Material Layering workflow
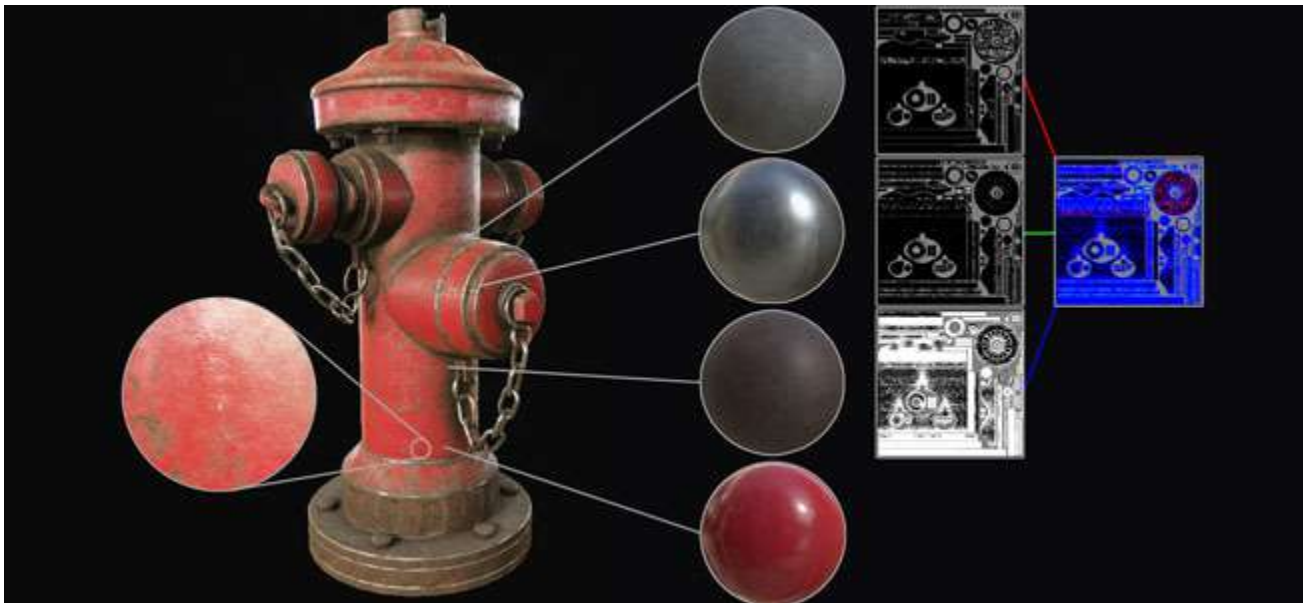
With this new version we add a new **workflow** called the **Material Layering**. Traditional texturing workflows rely on creating textures at **high resolution** to **preserve details** but this is **not convenient** for the use case. A more interesting approach instead is to **create small tilling material** and **repeat them inside a shader**. It allows to preserve a certain quality and the ability to **zoom really close** to the object using this shader **without losing details**. The only problem is that to preview the end result it was previously mandatory to go to the game engine/renderer that display the final shader. That's not true anymore since in this new version it is now possible to use a similar shader inside Substance Painter, which let you **visualize the end result and paint at the same time**.

A **new sample project** named "**FireHydrant**" has been added to showcase the new workflow.
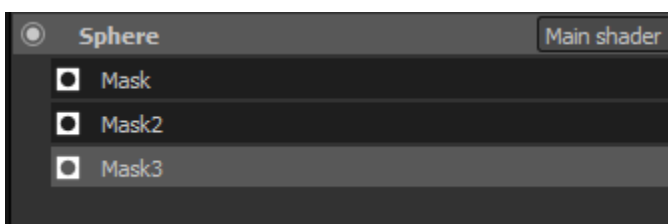
This new workflow opens two ways of working :

- Materials are defined in the shader, you can only paint masks to blend them
- Materials and Masks can be painted together

In any case, it is possible to define a new layer stack each time which gives more freedom when creating the masks and materials. Management of layers is much more easier this way and each stack can have its own set of specific channels that can be blended in the final shader.
We also have a special shader for Unity 5 and Unreal Engine 4 available on Share :

- Unity 5
- Unreal Engine 4

For more details, see the dedicated page of the documentation : Dynamic Material Layering

New mini-shelf search field
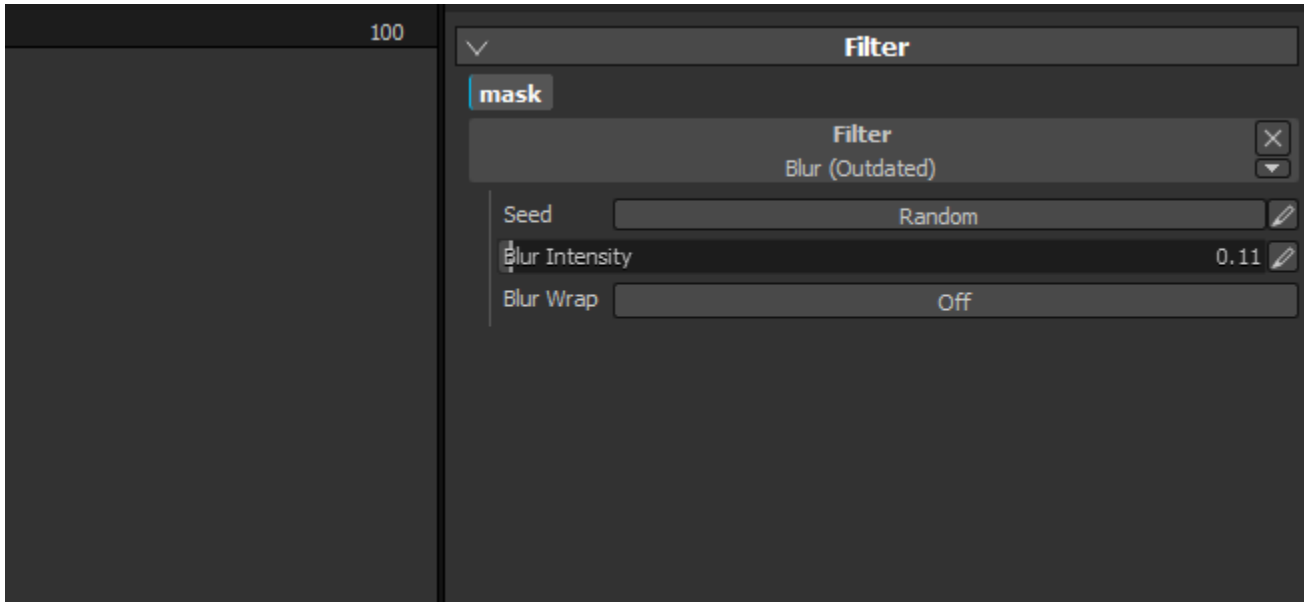
We improved the **mini shelf** that appear in various place of the application with a dedicated search field. This improvement makes the search for ressources much more convneient and pleasant to use. The custom search is preserved during the current session of the application. For example, if you use a lot grunge noises, using this keyword will makes

Tutorial

Our latest video tutorial cover the new features :

Release Notes

2.2.0

(Released 21 July 2016)

Added :

- [Shelf] Improve search system and queries
- [Shelf] Add search field for mini-shelves
- [Shader] Allow to define step precision for sliders
- [Shader] Add an Undo/Redo button for shader parameters
- [Shader] Reloading a shader should not reset its parameters
- [MatLayering] Add support for Dynamic Material Layering and sub-stacks
- [MatLayering] Allow to import json file to setup the shader settings
- [MatLayering] Unlock texture samplers limit (switch to Bindless textures)
- [Scripting] Allow to set bakers settings and launch their computation
- [Substance] Use "usage" for inputs/outputs connections in addition of identifiers
- [Tool] Allow to select the preview channel in the viewport for the Projection Tool

Fixed :

- Crash during launch if substances are located in wrong folder
- Crash report sometimes doesn't work because of incorrect log file
- [Iray] Post effects don't refresh when Iray is paused
- [Iray] Auto-focus shortcut doesn't work anymore
- [Iray] Aperture slider behavior change depending of asset size
- [Layers] First material channel is not enabled by default if they are all disabled
- [Shader] No errors are printed if a "param auto" is incorrect

Known Issue :

- [Mac] Texture samples limit is locked at 16 (GPU driver issue)

Version 2.3

Substance Painter 2.3 improve the scripting API in order to release its first official plugin : a Photoshop export with the full layer stack available.

Release Date : *15 September 2016*

Major features

New Photoshop export plugin
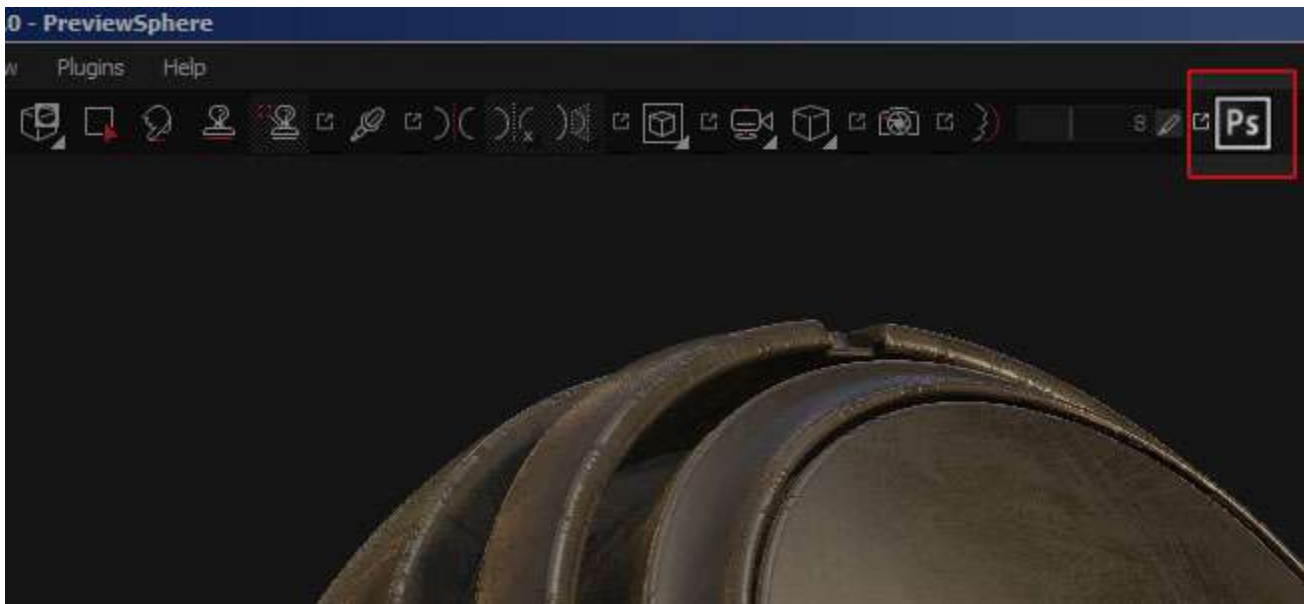
With this release we focused on adding new possibilities in the scripting API in order to implement **an advanced exporter for Photoshop**. To access this new export, simply click on the Photoshop icon available in the main toolbar (if the plugin is activated, which the case by default). The plugin allow to export the full layer stack available in a texture set and create a similar structure inside a PSD file. This feature **require to have Photoshop installed** on your computer in order to be able to generate the PSD file.

A few options are available via the configure button of the plugin menu :
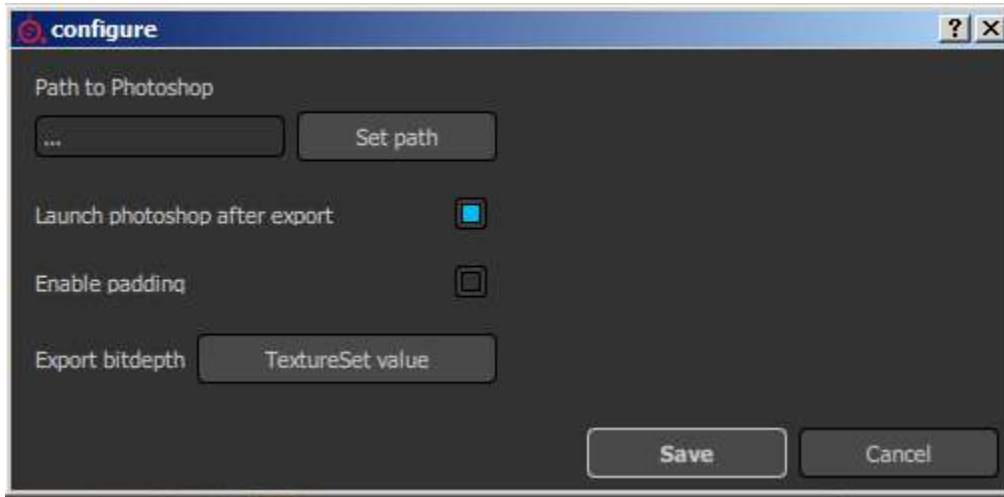
Tutorial

Our latest tutorial explains the export process with the new plugin :

Release Notes

2.3.1

(Released 7 October 2016)

Added :

- [Plugin][Photoshop] Allow to specify which material/stack/channels to export
- [Scripting] Function names have some inconsistencies

Fixed :

- [Export] Alpha can be discarded in custom export presets
- [Export] Alpha gets incorrect gamma conversion on sRGB channels
- [Export] Non-square documents are exported as squared
- [Export] Impossible to export additional maps if one is missing
- [Iray] Some parameters (like emissive Intensity) have no effect
- [NVIDIA] Crash at Startup with NVIDIA Quadro K2200/GTX 750/760
- [AMD] Incorrect set of colors for thumbnails and previews
- [AMD] Freezes and driver failure on New File and File Open
- [Log] "software-version" is missing from log file

2.3.0

(Released 15 September 2016)

Added :

- [Plugin] New "Export to Photoshop" plugin (export complete layer stack)
- [Export] Allow to specify the width of the padding (in pixels or infinite)
- [Export] Allow to set the type of background outside of the UVs
- [Shelf] New material layering shader to blend 10 materials
- [Shelf] New clay shader to view details with the height/normal channel
- [Shelf] New baked lighting filter with environment input
- [Shelf] Updated some mask generators to add non-square transformations
- [Viewport] Add composited normal map (normal+height+bake) to the solo mode
- [Scripting] Allow to export additional maps
- [Scripting] Allow to query available Additional maps per Texture Set
- [Scripting] Allow to retrieve channel format
- [Scripting] Add examples in the baking documentation
- [Scripting] Allow to query the visibility of a layer
- [Scripting] Allow to query layer's blending mode and opacity

- [Scripting] Allow to export converted maps (final normal maps, mixed AO, etc.)
- [Substance] Read and connect custom usages
- [Shortcuts] Add modifier key (SHIFT) to cycle solo mode backward
- [Export] Updated default export preset to disable alpha
- [UI] Thumbnails are now only computed if the engine is available
- [UI] Display a mention when thumbnails are computing

Fixed :

- Crash with some old projects when opening them
- Crash with corrupted texture channels cache
- Crash when blending more than 4 materials with Material Layering workflow
- [UI] Tool shortcuts don't work if the toolbar is hidden
- [UI] Iray toolbar is labeled "Untitled" in the View Menu
- [UI] Plugin toolbars are named "Untilted" in the View Menu
- [Baker] Pressing Enter while editing a bake setting launches the bake process
- [Baker] Incorrect ranges for some parameters
- [Import] Impossible to import OBJ meshes because of very big numbers
- [Import] Some OBJ files are imported with too many sub-objects
- [Export] channel background is filled with black instead of default color at export
- [Tool] Particles don't work properly if FOV is too low
- [Tool] Brush preview color is incorrect with masks in sub-stacks
- [Viewport] When brush goes into empty areas in 2D view it becomes gigantic
- [Viewport] Blank brush preview when painting Normal textures
- [Scripting] Incorrect documentation : "ao" listed instead of "ambientocclusion"
- [Scripting] Process started with subprocess() is killed when closing Painter
- [Shelf] Baked lighting filter use incorrect AO input
- [MacOS] Removed Fire Hydrant project (incompatible)
- Default project opens when loading a *.spt file (instead of *.spp)

Version 2.4

Substance Painter 2.4 focus on improving the shelf window as well as the managements of resources.

Release Date : *27 October 2016*

Major features

New shelf window with advanced filtering
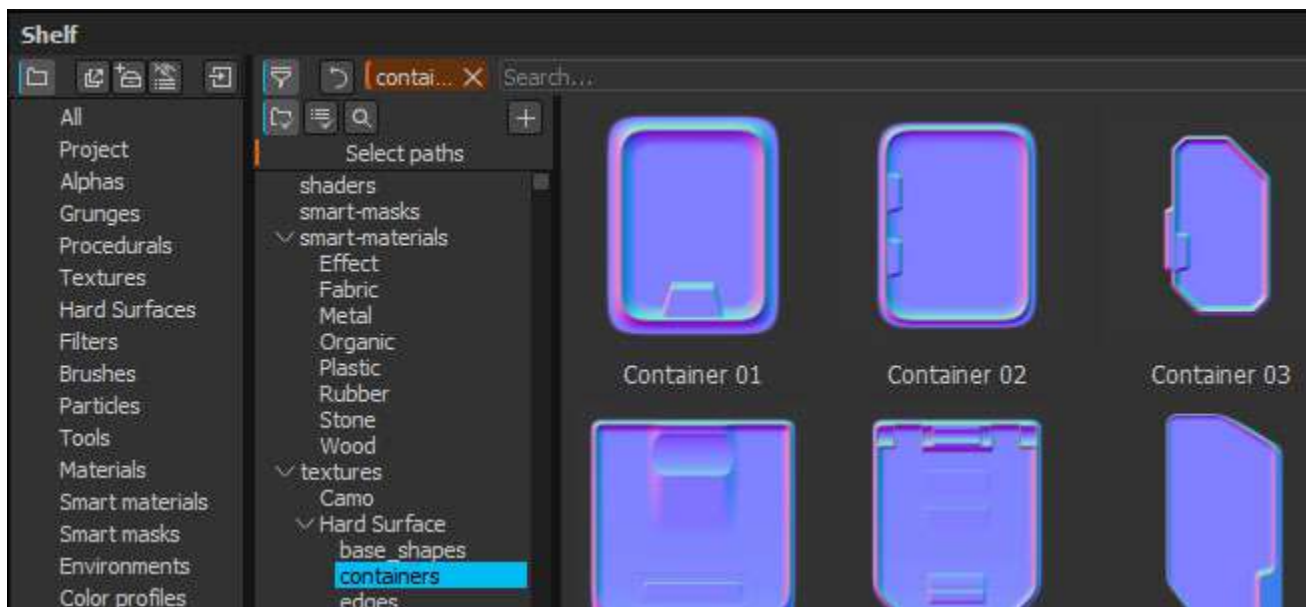
The new shelf window provide a **better organisation** of resources alongside **new ways of filtering content**. We added the possibility to create **custom presets** where each preset has its own filtering (allowing to quickly switch between different queries). These presets can also be i**solated into a new window**, offering a way to have **multiple views** of the shelf and not only one like before. The filtering also offer a way to **browse the hierarchy of folders on the disk**, becoming handy when refining a more general query. We also improved the **context menu** (when right-clicking on a resource) to provide **more useful information**.

For creating advanced queries, see the dedicated part of the documentation : Filtering shelf content

New import resource window
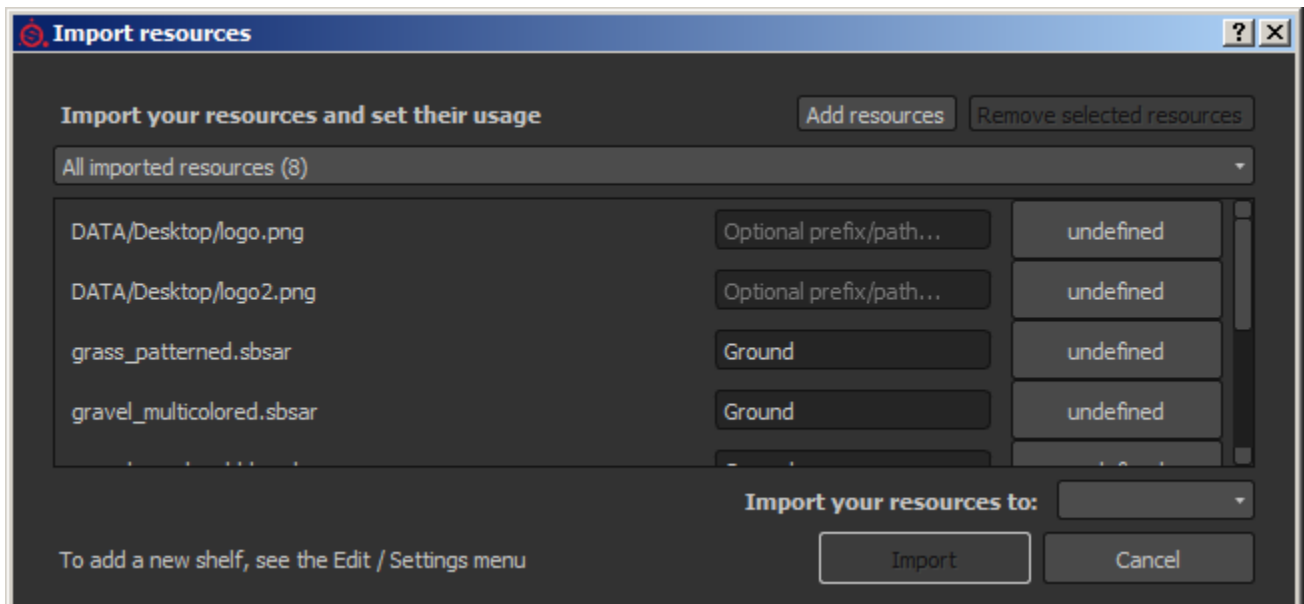
With the rework of the shelf we also **improved the resource import window**. The window is now more consistant and can be **called in three different ways** : via the file menu, via the button in the shelf window, or just like before by drag and dropping a resource into the shelf window. The new window allow to **quickly set the usage** for **multiple resources** at once, which means you don't have to drag and drop resources into the right location first anymore. We also added the possibility to **specify a custom path** to create sub-folders in order to take advantage of the new tree view.

For more details, see the dedicated part of the documentation : Adding content via the import window

New particle presets
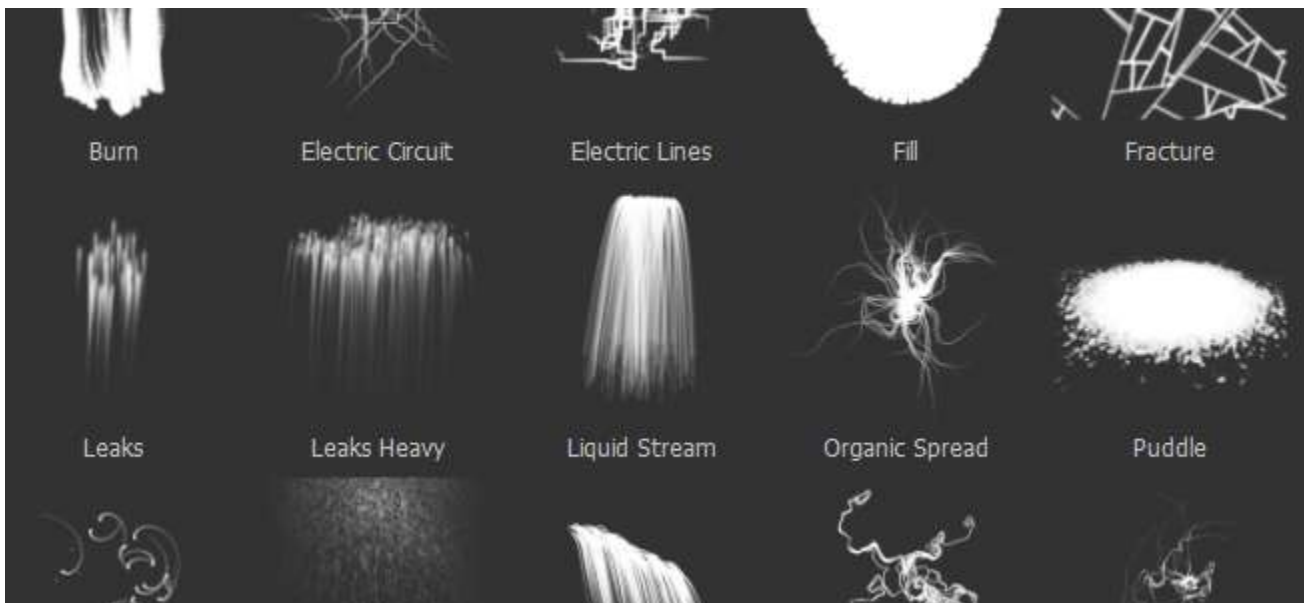
We **reworked** the previous **particles preset** to be more ready to use (especially the **Rain** preset). We also took this opportunity to **add new presets** with new behaviors : take a look at **Electric Circuit, Electric Lines, Rococo and Veins Small** !

Tutorial

The new shelf features and use is covered in our latest tutorial :

Release Notes

2.4.1

(Released 28 October 2016)

Fixed :

- Crash when creating a project with a template
- Crash when closing export dialog during an export
- [Mac] Errors when saving project (fail to export preset)
- [Shelf] Creating a new preset will display it twice
- [Shelf] Presets cannot be loaded in read-only mode without admin rights

2.4.0

(Released 27 October 2016)

Added :

- [Shelf] New interface to browse ressources (tree-view, filters and so on)
- [Shelf] Allow to save a search as a preset
- [Shelf] Allow to create a new window from a preset
- [Shelf] New interface for importing resources
- [Shelf] Don't copy default allegorithmic shelf in Documents folder
- [Shelf] New particles presets : Electric Circuit, Electric Lines, Rococo, Veins Small
- [Shelf] Improved older particles presets to be more easy to use (like "Rain")
- [Shelf] Add new information on resource contextual menu
- [Viewport] Improve performance when loading environment maps
- [Viewport] Add support of environment maps that are not power of two

Fixed :

- Crash when removing a mask
- Crash when painting after saving a preset
- Crash with environment blur on some GPUs
- Crash when assigning a wrong resource with the mini shelf
- [Shelf] Clean + Save remove tags and metadata for resources in the project
- [Shelf] importing a preset will display its ressources in the shelf
- [Export] Normal map generated from height channel has a low intensity
- [Export] Normal from mesh is not always present in final normal map
- [Export] Dilation with transparency can sometimes result with no transparency
- [Scripting] "alg.plugin_root_directory" can returns a truncated network path
- [TextureSet] Lock button is enabled when re-opening non-square projects

Version 2.5

Substance Painter 2.5 introduces a lot of new features : from the support of the opacity in the brush settings (in addition to the flow) to the ability to bake additional map in 8K and much more.

Release date : *21 February 2017*

Major features

New Brush opacity
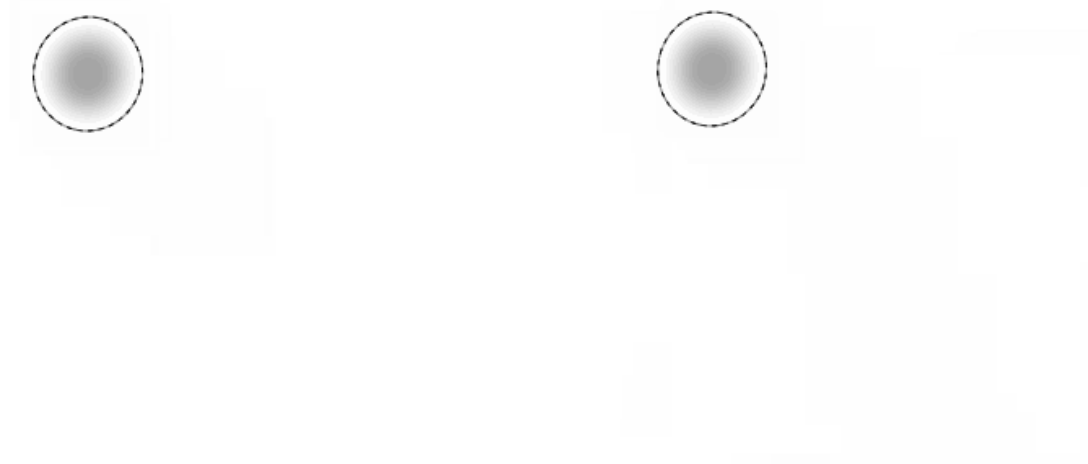
There is now a new setting in the **brush parameters** when Painting in Substance Painter which is the **opacity**.
The **opacity** control the **overall intensity of a brush stroke**, contrary to the **flow** setting which control the intensity of **each individual stamp** inside a brush stroke. This means that it is now possible to paint and repaint a same area **without creating overlapping values**. To do so, set the flow to 100 and the opacity value to the intensity you prefer. Because of how the opacity works, it is not possible to link it to the pen pressure. For that kind of control the flow is still the best choice.

We also added a **new modifier** alongside this new parameter which is on the **"A"** key by default. Pressing this key will allow **to continue the previous brush stroke** instead of creating a new one. This means you can paint a uniform color with the opacity you want while keeping the possibly to move the camera for example. Another example would be to continue the copy that you were doing with the clone tool.
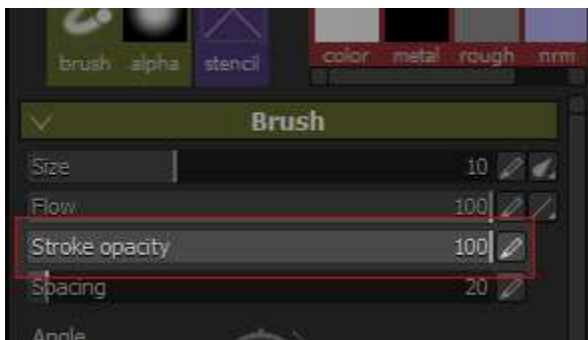
New baking at 8K and non-square resolutions
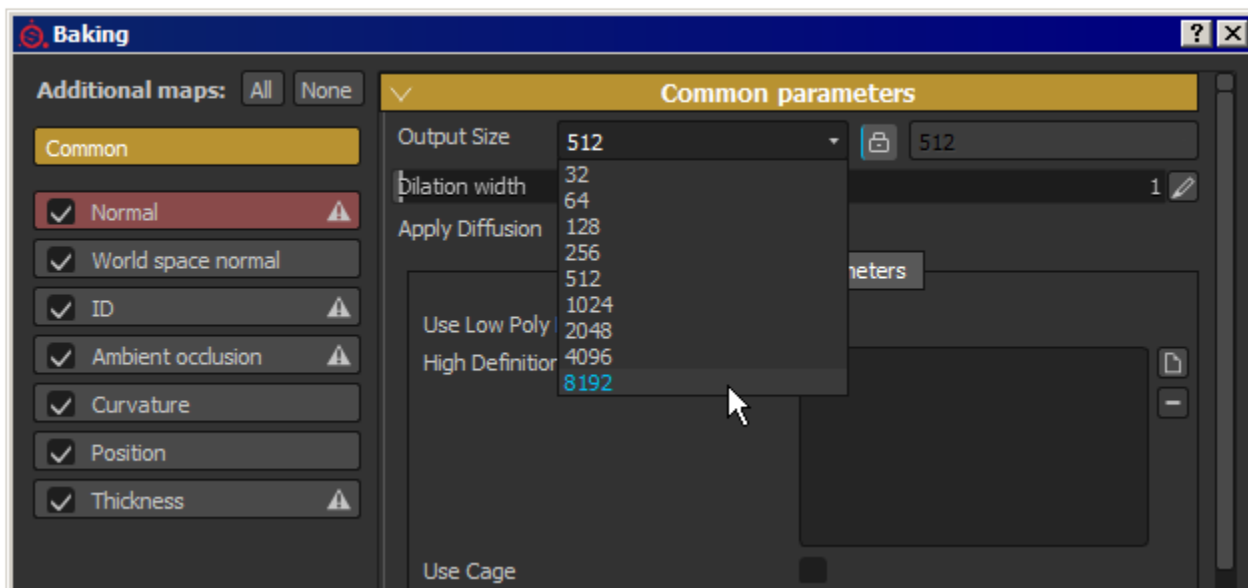
The baker have been improved to support resolutions up to **8192x8192** (8K plus anti-aliasing), meaning you can now export at 8K with 1:1 ratio with the additional maps.
We also added support for **non-square** resolutions. It is now possible possible to bake a texture of **4096x2048** for example. To do so, simply click on the "**lock**" icon next to the dropdown to select the resolution.

New support for Color Profile in the viewport

We added the support of **LUT** (textures) to control the rendering of the **viewport** in Substance Painter. To apply a profile, simply enable the "**Color Profile**" setting in the "**Display settings**" window and load the LUT in the dedicated slot. It work both with the **OpenGL** viewport (painting) and the **IRay** renderer. A few examples are available by default from common **Camera presets** to more **Artistic effects**. For more information, see the dedicated page of the documentation : Color Profile

New Substance engine compatible with Substance Designer 6
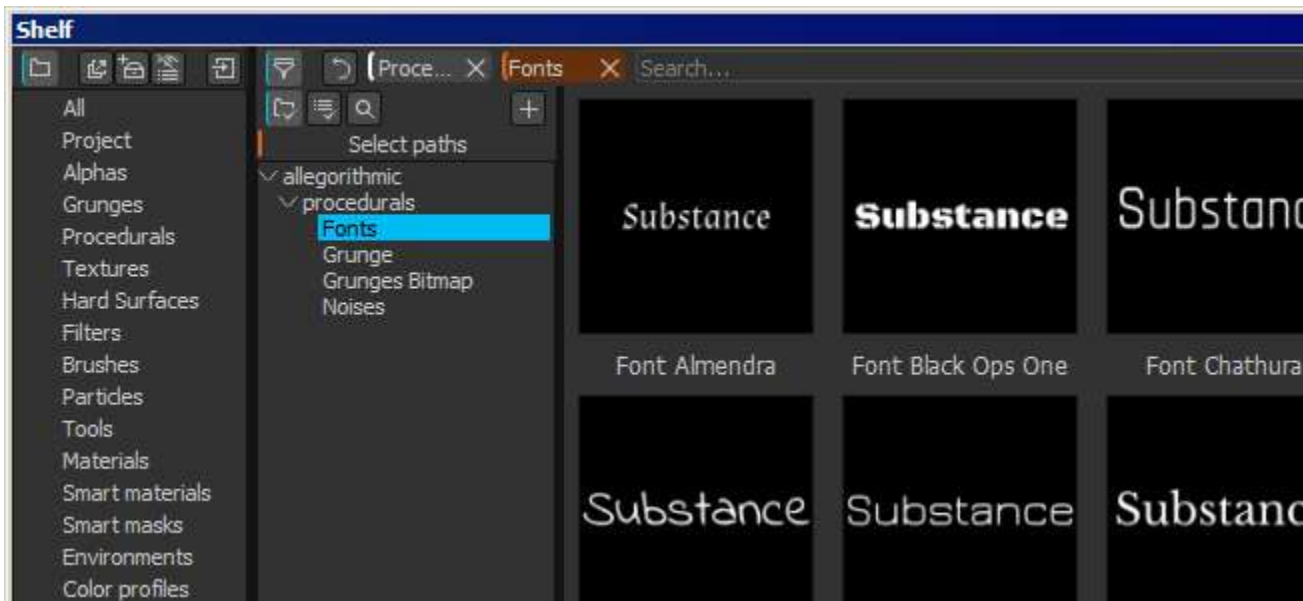
We added the support for **Substance Designer 6**, this means resources created with **SD6** can be opened and used in **Substance Painter 2.5** !
A good example is the ability to use the **new text node** of SD6 and integrate it into a substance. This way it is possible to create **dynamic text** and paint them directly without the need to leave the application. **We included 10 fonts** with each a different style by default to cover the most common use. You can find them in the "**procedural**" section of the **shelf**.

New content in the shelf

Blur Directional   Contrast Luminosity   Gradient   Highpass   Histogr

m shift   HSL Perceptive   Mirror   Sharpen   Transform   W
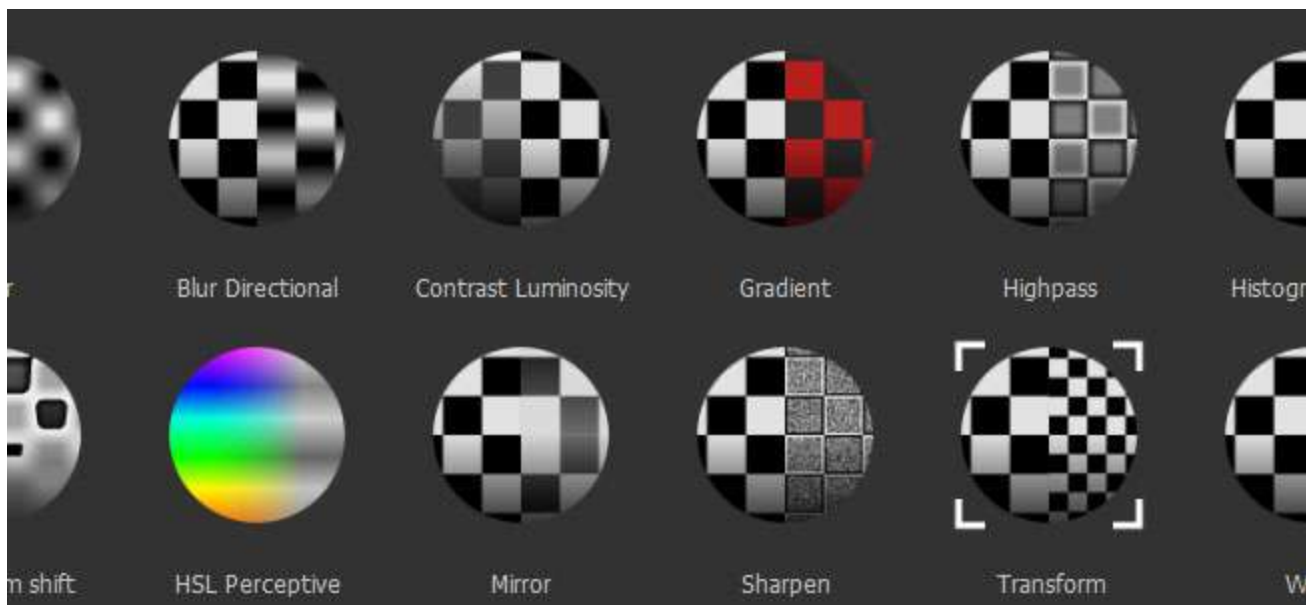
Alongside a few fixes and improvements with the new shelf, we also added a bunch of **new filters** to improve the painting and texturing. We also **improved** the behavior of already existing filter (like the "**HSL**"). We also added new **templates** when creating **new projects** (such as **Unity 5** and **Unreal Engine 4**).

New scripting improvements with support for custom shader UI
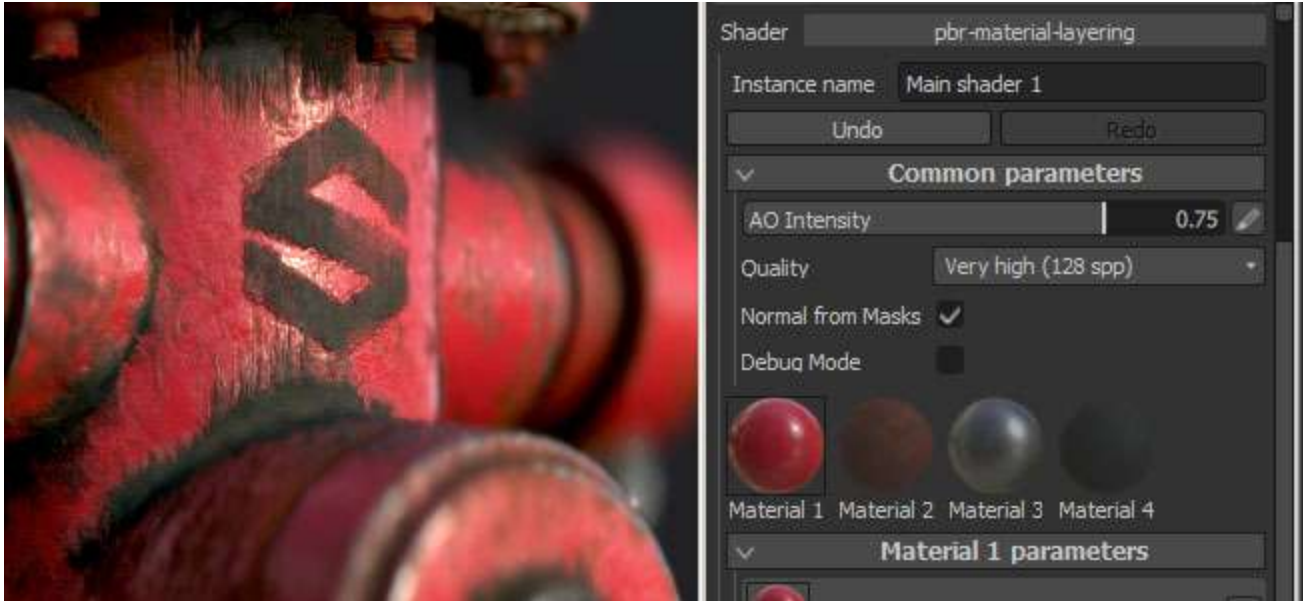
With this release we added a way to **script and control** the **shader parameters**. We also added the support for using a **custom UI** instead of the default one, opening a lot of new possibilities such as **animated shader**.
For more details take a look at the scripting documentation available from the Help menu of the application.

Tutorial

The new major features are covered in our latest Twitch stream :

Release Notes

2.5.3

(Released 15 March 2017)

Fixed :

- [Baker] Crash when baking with specific meshes

Known Issue :

- [Mac] Particles can create texture corruption in some cases

2.5.2

(Released 14 March 2017)

Fixed :

- [Tool] Wacom tablet don't work on Linux
- [Tool] Black artifacts when using the smudge tool
- [Bakers] Baking fail if Match By Name is used with a cage
- [Bakers] Ambient Occlusion broken when baking with Normal Map only
- [Shelf] Generic filters don't handle alpha properly (Contrast/Luminosity, Highpass, etc.)
- [Viewport] Performance issue when loading a project with shadows enabled
- [Viewport] Dithering issue in 3D View on MacOS
- [Viewport] Particle previews incorrectly displayed when color profile is enabled
- [Iray] Crash when switching project back to OpenGL if Iray failed to initialize
- [IRay] Glossiness is ignored when rendering SpecGloss shader/mdl
- [Shader] Spec/Gloss shader doesn't match Iray and SD
- [Shader] sRGB conversion different from linear to sRGB LUT conversion
- [Shader] Incorrect rendering when loading project with outdated shaders
- [Shader] "pbr-coated" shader doesn't work anymore
- [Export] Some channels are still exported even if not present in the texture set
- [Layers] Blending mode "normal map inverse detail" doesn't work on grayscale channels
- [UI] Issue on "Color selection window" with HDPI monitor and display zoom at 150%

Known Issue :

- [Mac] Particles can create texture corruption in some cases

2.5.1

(Released 27 February 2017)

Fixed :

- [Mac] Wacom tablet input broken in 3D and 2D view
- [Bakers] Matching by name doesn't work anymore
- [Bakers] "Average Normals" setting doesn't work anymore
- [Iray] Incorrect rendering with missing baked normal map
- [Iray] Color Profiles behave differently in comparison to OpenGL renderer
- [Iray] Exporting render as bitmap doesn't include color profile correction
- [Substance] Material filters don't work anymore
- [Tool] Stroke opacity isn't stored in brush presets
- [Tool] Clone Brush UV Alignment doesn't work anymore
- [Export] Displacement channel should be centered in 0.5 when exporting in integer
- [Template] Absolute path is stored in Templates
- [TextureSet] Channel texture persist after removing the channel

Known Issue :

- [Linux] Wacom tablet input don't work in 3D and 2D view
- [Mac] Particles can create texture corruption in some cases
- [Export] In very rare case, black rectangles can appear on AMD GPUs

2.5.0

(Released 21 February 2017)

Added :

- Add support for AMD Radeon Pro and AMD FirePro GPUs
- [Tool] Add support for stroke opacity
- [Tool] Add a modifier that allow to continue the last brush stroke
- [Iray] Update to support Pascal GPUs
- [Viewport] Add support for Color Profiles (LUT)
- [Substance] Integrate new framework (SD6 engine)
- [UI] Increase "recent file" size list in File menu
- [Import] Use category from substances to fill the prefix in the import dialog
- [Bakers] Allow to bake 8K textures
- [Bakers] Allow to bake non-square resolutions
- [Bakers] Improve memory consumption when baking heavy high-poly meshes
- [Shelf] Lock shelves (and projects) to forbid concurrent editing and avoid corruptions
- [Shelf] Read category and keywords from substances to use them for filtering
- [Shelf] Allow to exclude ressources from the result of a search query
- [Shelf] Improved thumbnails time computation
- [Shelf] Allow to embed presets in projects
- [Shelf] Allow to quickly collapse/expand the tree-view with SHIFT
- [Shelf] Allow to save thumbnails when assets are read only (local cache)
- [Shelf] New content : new filters (transform, mirror, tri-planar, etc.)
- [Shelf] New content : new LUTs profiles (classic and artistic, such as Film Noir, Vintage, etc.)
- [Shelf] New content : 10 new Font Substances to quickly generate custom texts
- [Shelf] New templates : Unity 5 and Unreal Engine 4
- [Shelf] Improved HSL filter to be more artist friendly
- [Shader] Add support for specular level channel in PBR shaders
- [Shader] Add support for Dithering in Alpha Test shader
- [Shader] Add support for parallax occlusion mapping in PBR shaders
- [Shader] Allow to define custom UI for shader parameters
- [MatLayering] Create new Mask channel for material layering workflow
- [Scripting] Allow to write metadata in a SP project
- [Scripting] Allow to export with a specific export preset
- [Scripting] Allow to retrieve shader parameters as a JSON
- [Scripting] Add support for WebSocket connections
- [Scripting] Add the possibility to load shader instances
- [Scripting] Add the possibility to create a new project
- [Scripting] Allow to retrieve the url of the mesh imported in a project
- [Scripting] Allow non square baking
- [Scripting] Report errors when setting data via scripting API
- [Substances] Add user-data tag to specify normal map format

Fixed :

- Crash when picking color with substances
- Crash when loading a non RGBA32f image as environment map
- Crash related to painting on AMD GPUs
- [Mesh] OBJ import doesn't recognize materials without mtl file
- [Mesh] UDIM Texture set name generation can be incorrect on some meshes
- [UI] Undo/Redo button in Viewer Setting steal focus and stop mouse scrolling
- [UI] Some labels are incorrectly cropped in High-DPI
- [Layer] Replace mode for paint effect has an incorrect behavior on Mask
- [Layer] Subtract blending mode has an incorrect behavior with alpha
- [Tool] Brush size becomes huge in 2D View when painting on UV borders
- [Tool] Snapped straight line has erratic behavior with High-DPI
- [Tool] Stencil resolution is sometimes incorrect
- [Bakers] "Max Occluder Distance" values are clamped if "relative to bounding box" is "Off"
- [Shader] Stack and auto param channel definitions don't match
- [3D View] Inconsistent display of the normal channel depending of project setting
- [Viewport] Some normal maps have clamped values which appear as artifacts
- [Viewport] Post-effect are always disabled by default
- [Export] Normal mixing setting is incorrect if normal channel is missing
- [Export] Incorrect texture generation in some cases on AMD GPUs
- [Export] Shader parameters are not exported properly if located inside a group
- [Export] Editing an export preset in a custom shelf output a log error
- [Shelf] Tree-view filtering does not match exactly the folder name
- [Shelf] Renaming a shelf preset is hard to read
- [Shelf] Shader resource imported in the Shelf isn't preserved after relaunching
- [Shelf] Content : Weld tool preset is missing
- [Shelf] Content : Tile Generator doesn't work properly
- [Shelf] Content : Fixed incorrect mask on Rubber Tire Dirty smart material
- [Shelf] Content : Fixed incorrect group name on Leather bag material
- [Iray] Half of meshes are missing in Iray
- [Linux] Crash when dragging a resource above the 3D View
- [Mac] Preferences are reset at every launch on Sierra

Known Issue :

- [Export] In very rare case, black rectangles can appear on AMD GPUs
- [Iray] Color Profiles can behave in odd ways sometimes

Version 2.6

With **Substance Painter 2.6** our focus was to provide a way to manage the texture sets directly inside Substance Painter, without the need to make a new project or reimport your mesh with updated material names. We also wanted to provide a way to update resources used in projects, something we saw requested a lot in the past.

Release date : *27 April 2017*

Major Features

New sample project "Meet Mat"

This new sample project offer a new shiny and adorable character named "**Mat**". It contains three texture sets ready to be painted on. Participate in the **Meet Mat** contest with it to win some really cool prizes : https://www.allegorithmic.com/contest/meet-mat-2017-substance-3d-painting-contest

New scripting API with ability to update resources in projects
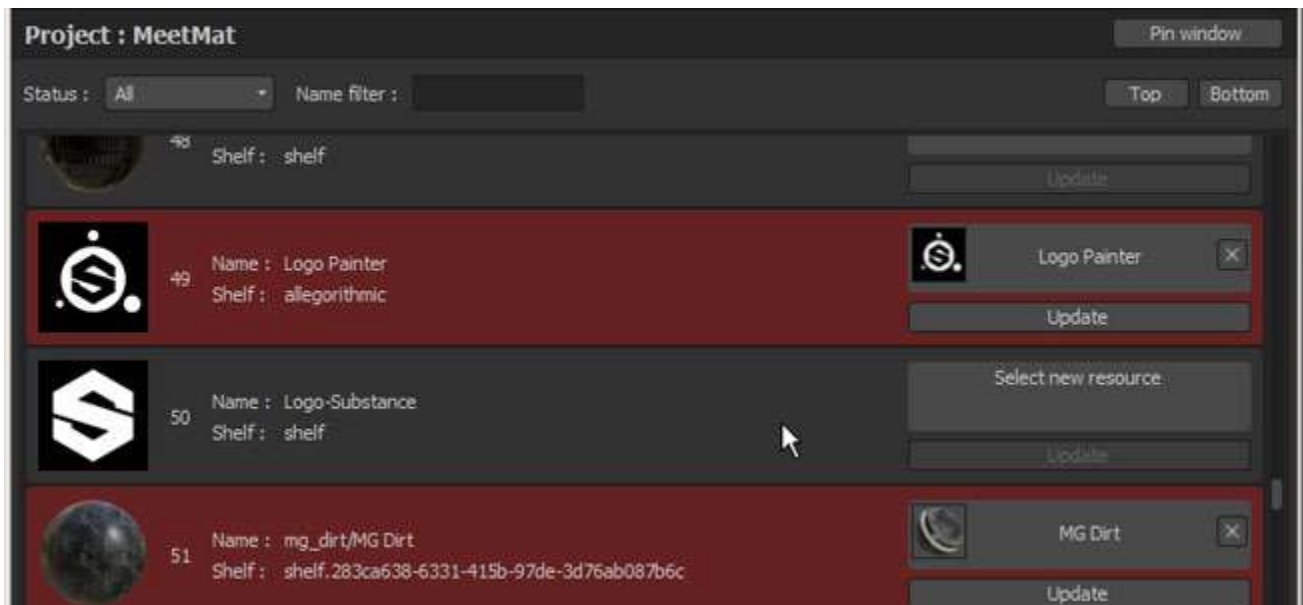
The scripting API of Substance Painter has been improved to add new functions that allow to **replace resources** in project with other versions. To demonstrate this new feature, a new **plugin** created with the scripting API has been added and allow to browse all the resources contained in a given project. Resources marked as red are detected as "outdated" and can be automatically replaced. This feature is not limited to "outdated" resources, any asset can be replaced with something else. This offer a lot of new possibility and show even more how Substance Painter is a **non-destructive Painting tool** !

The **plugin** is available on GitHub, don't hesitate to help if you see potential improvements : https://github.com/AllegorithmicSAS/painter-plugin-resources-updater
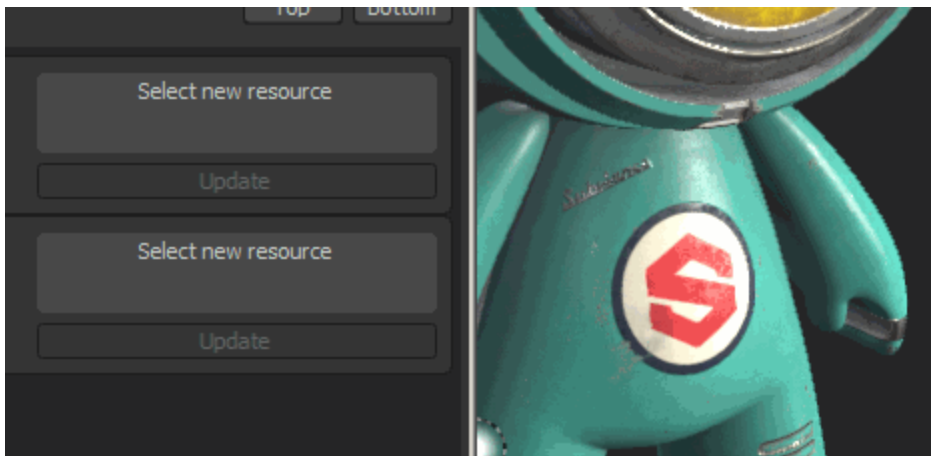
New ability to rename and reassign texture sets
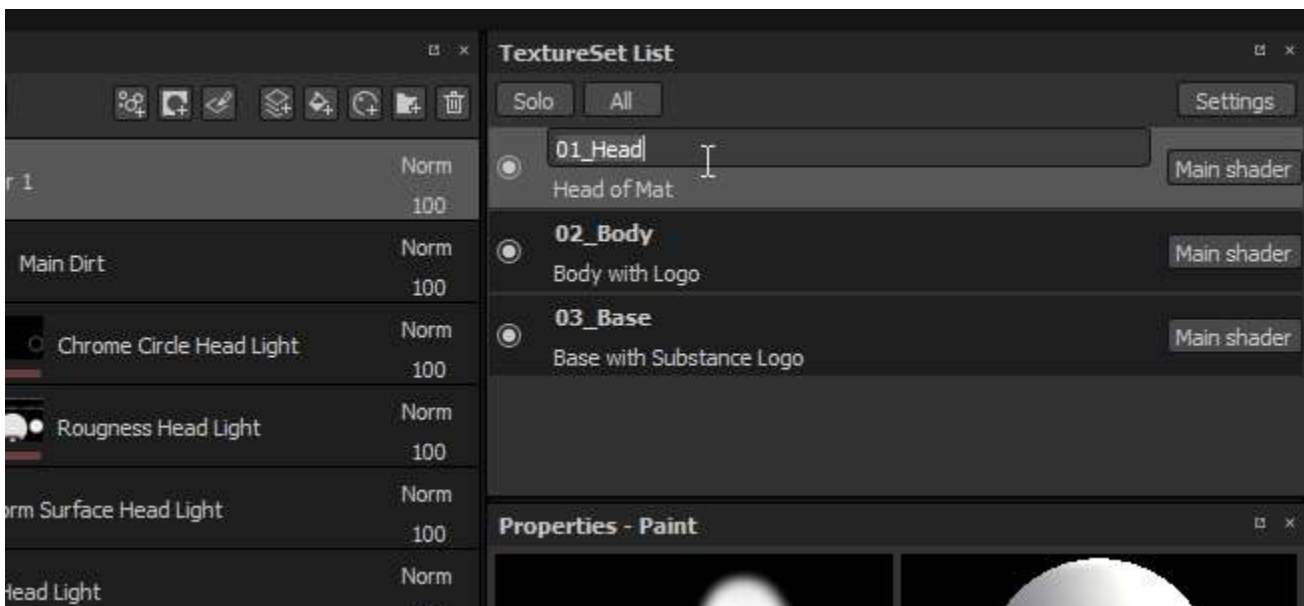
It is now possible to change the name of a texture set directly inside Substance Painter. Renaming a texture set will affect the name of the textures that are exported on the disk (depending of the export preset used).

To rename a texture set, simply double click on its name to modify it or use right-click to open the context menu. It is also possible to add custom descriptions to give more information about what texture sets do. This can be really helpful when working on an UDIM project. Use the "**settings**" button to configure the way descriptions are displayed in the list.
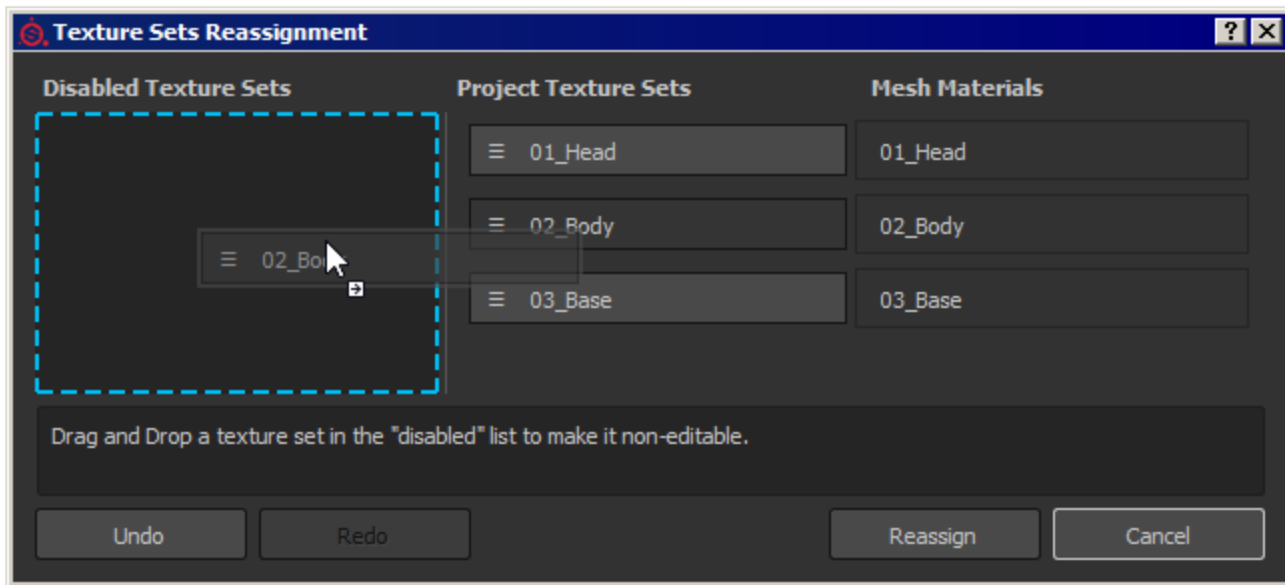
Texture Sets can now be reassigned to different Mesh Materials. This means it is possible to **recover** Texture Sets previously disabled (because they were missing on the mesh) or even **swap** them. Simply click on the new "**settings**" button in the Texture Set List window and click on the "**R eassign Texture Sets**" entry. It will open a new window dedicated to managing the Texture Sets and how they are linked to the Mesh Materials. The management can be done by **drag and dropping** a texture set name where you want.

Tutorial

The new major features are covered in our latest video tutorial :

Release Notes

2.6.2

(Released 20 October 2017)

Added :

- [Texture Set] Allow to delete disabled texture sets
- [Shelf] Allow multiple users to write inside the same shelf folder
- [Scripting] Be able to reload plugins folder
- [Scripting] Add a required minimal API version in plugin metadata to ensure compatibility
- [IRay] Export image dialog improvements

Fixed :

- [Engine] Disappearing strokes issue, when changing resolution (4K>2K)
- [Bakers] ID Map Baking fail with Match By Name enabled
- [Bakers] Error messages are not explicit enough
- [3D View] Tangent space is not synched with bakers
- [Tool] Black artifacts when using the smudge tool
- [Shader] Non-PBR shader doesn't work anymore
- [Shader] "pbr-coated" is broken
- [Shader] Coating Roughness of "pbr-coated" shader has no impact anymore
- [Shader] Spec gloss shader doesn't match Iray and SD
- [Shelf] Crash when loading two files with the same name but different extensions
- [Shelf] Can't edit preset anymore in the shelves
- [Shelf] Cannot set a custom preview for assets imported in the shelf
- Resources loaded from the cache lose their usages
- Saving a project before creating a template returns write permission errors
- Incorrect project save if filename contains two periods
- Importing files with multiple dots (.) in the filename causes issues

2.6.1

(Released 12 May 2017)

Added :

- [TextureSet] Don't allow to reassign mesh materials to nothing

Fixed :

- Crash when switching of TextureSet after replacing baked map
- Crash when doing "Undo and Redo" after changing layer's blending mode
- Crash or Freeze when using the "color selection" effect with big ID map
- [Export] Texture Sets renamed are not sorted alphabetically in the export window
- [TextureSet] Reset to default name doesn't check for unicity
- [TextureSet] Renamed texture set become disabled after reopening project
- [Shelf] Missing default templates content
- [Shelf] Non-square textures are displayed as square
- [Shader] Once a texture set is disabled the associated shader is destroyed
- [Scripting] alg.baking.setTextureSetBakingParameters() doesn't work anymore
- [Scripting] Typo in websocket tutorial
- [Scripting] Various problems in AlgWidgets
- [Log] Incorrect detection of available virtual memory in some cases

2.6.0

(Released 27 April 2017)

Added :

- Add new sample project "Meet Mat"
- [Plugin] New "Resources Updater" plugin
- [TextureSet] Allow to rename and add a description to texture sets
- [TextureSet] Allow to reassign materials
- [TextureSet] Add a setting button in the texture set list window
- [TextureSet] Show "disabled" texture sets at the bottom of the list
- [Substance] Use additional maps at the current texture set resolution to improve performances
- [Scripting] Allow to update a resource used in a project (material, generator, etc.)
- [Scripting] Add a way to add/remove a shelf
- [Scripting] Allow to query info from resource in projects
- [Scripting] Allow to retrieve a list of available shelfs
- [Scripting] Improve AlgWidget thumbnail tutorial
- [Export] Disable/Enable bit depth based on file format support
- [Log] Add plugin name to print in console
- [Log] Remove error about hidden texture sets
- Update "Welcome Screen" with new icons and text for samples

Fixed :

- Crash when updating a mesh in specific projects
- [Viewport] Symmetry plane inner color is not visible anymore
- [Viewport] Some post-process effects are enabled when using the solo view
- [Shaders] "over_premult" blending doesn't work properly
- [Shaders] Warning about alpha-test with the default shader
- [Shelf] Incorrect parsing of tags from Substances
- [Shelf] MatFX Rust Weathering doesn't work properly
- [Shelf] HSL filter is enabled on incorrect channels by default
- [Shelf] Sharpen is enabled on Height/Normal channel by default
- [Export] Vray export presets don't use an OpenGL normal map
- [Tool] Imprecision issues with clone/smudge tool create artifacts

FAQ

Here you can find the most commonly asked questions about Substance Painter.
If a question is not answered here, we invite you to contact us by e-mail or by going onto our forums.

- Performances Guidelines
- Exporting the log file
- Exporting a DXDiag
- Technical Issues

Performances Guidelines

Substance Painter can be very demanding when working in specific conditions (like at very high texture resolutions), to ensure a good workflow it is good to know how to work with these constraints. This page regroups tips and tricks on how to maximize performances.

Conflicts and background applications

Some applications running in the background can interfere with Substance Painter and create some issues. Anti-Spyware and Anti-Virus software can create some troubles for example, so disabling them can help.
We also have a page listing know application that could either crash Substance Painter or at least slowing it down: Software conflicts

Mesh and UV setup

Substance Painter does not support well meshes divided in a lot of individual sub-meshes. It is better to combine meshes together (but not necessarily attach the polygons together), otherwise the application will experience a lot of slow downs. There is no polycount limit however, Substance Painter can handle a large amount of triangles (multiple millions).

UVs can have an impact too. Substance Painter works by dividing a texture/channel into smaller chunks to speed up computations. However this optimization will be made useless if when painting on a mesh in the 3D view, the brush stroke has to be done at different corners of the texture. Grouping UV islands together instead of relying on automatic packing in a modeling software can have a big impact on performances.

GPU Drivers

We cannot guarantee performance without the use of recommended drivers. Non-WHQL drivers must be avoided.
GPU Drivers drivers are like any software, each new release can introduce performance issues. If a problem appears at one point, we recommend to try to downgrade to a previous version.

Multi/Bi-GPU

Substance Painter doesnot support multiple GPUs, this means feature like NVIDIA SLI or AMD CrossFire are not supported.

We advise **disabling** them when using the application, otherwise they may introduce performance and stability issues. A single but more powerful GPU will always give better performance than two smaller one.

NVIDIA Drivers Settings

Some default NVIDIA settings can have an impact on performance, we recommend to create a profile and to disable the following parameters (set them to off) :

- Threaded Optimization
- Vertical Synchronization

GPU VRAM amount and bandwidth

Substance Painter relies a lot on the GPU to perform most of its computations. This is why it is important to have a GPU that follows the Technical Requirements.
The software works by transferring textures into the GPU memory (VRAM) in order to do the computations (like blending operations to create the final textures). However if the VRAM is starting to get full, the unused textures will be transferred back to the RAM of the computer to free some space. Substance Painter writes and reads GBs of data when working. This means that both the capacity of the VRAM (amount) and the bandwidth speed when doing transfers are important. You can use tools such as MSI AfterBurner to monitor this behavior.

> The **Nvidia GTX 970** is known to have a problematic design regarding its GPU memory that affects Substance Painter. The last 500MB of the whole 4GB work at a slower pace than the remaining 3.5GB. If Substance Painter works on those last 500MB, the performance can be reduced by 10 times factor (from what we measured). For more technical details, see : https://www.pcper.com/news/Graphics-Cards/NVIDIA-Responds-GTX-970-35GB-Memory-Issue

GPU VRAM and other applications

Substance Painter is not alone when working with the GPU, other applications can do the same. The Unreal Engine 4 for example will require something like 70% or even 80% of the GPU memory. A solution to ensure good performance while keeping theses applications is to be sure Substance Painter is launched first in order to request its own VRAM allocation. Still, some software can require some parts of the VRAM dynamically and can still be in conflict with Substance Painter even if it was launched after.

Texture Sets amount

The total number of texture sets will have an impact on performance in the viewport. After 15/20 texture sets (if all at 4K resolution) performance can drop quite a lot. We recommend at least to hide texture sets that are not necessary via the texture set list while working. Splitting a mesh in multiple projects can be another solution. A another good idea is to switch the resolution of unused texture sets to a lower resolution. This will help the viewport and avoid loading too many big textures in VRAM. Remember that Substance Painter is non-destructive and the resolution can be changed back to a higher value during the export.

Layer management

Painting on layers that are below the other layers in the layer stack can have a major impact on performance, similar to Substance Designer when you tweak a node at the source of a graph: by changing a layer early, you end-up computing the layers on top simply because of the hierarchy. A solution to that is to hide the layers on top of the one you are currently working on (temporarily). Then unhide them once you have finished, this way the computation of the layers above will be done only once and not during each brush stroke. You can also group all the layers above in one individual group with the blending mode set to Normal. Doing so will avoid computing the layers/group individually for the engine.

Channels'management

Channels are uncompressed, this means that when working with multiple textures/channels (height, basecolor, metallic, roughness and so on) you end up with 4 or more textures at the resolution of your document that need to do some back and forth between the software and the VRAM (the GPU memory), you end-up with a lot of bandwidth consumption. A 32bits height map will be around 190mb for example. The uncompressed map per channels adds up quickly in size, in addition to all the substances and materials than need to stays in VRAM in order to be able to compute the result of the blending. So very quickly the VRAM will be filled. Therefore Substance Painter end up doing a lot of back and forth with the GPU. A 4K by 4K texture set can consume something like 4 to 8 GB per second on very complex layer stack.

Also when using fill layers or tools, don't hesitate to disable channels that you don't need. This will allow the engine to discard the computation for these specific channels and will speed up performance in the long run. This can be done by setting the blending modes of a layer to "disable" too.

> Substance Painter 2017.3 introduced the block compression system which makes faster transfers between system and GPU memory. However this system is only enabled when the amount of free memory in the GPU is low. Having a GPU with a high amount of memory will still provide better performance.

Substance filters and materials

If you are creating your own substances, do not forget to take a look at the performance guidelines for Substance Designer.

Viewport display

In some cases, the solo mode can help a bit to have better performance by speeding up the viewport computation. However in the background, all the channels are still computed, whether you display all of them with the PBR/Material view or via the solo channels.

Exporting the log file

When you need support regarding Substance Painter, it is always good to share your log file has it give context about your computer configuration.

You can export the log file directly from Substance Painter by going to the **Help** menu and then selecting the **Export log** item.
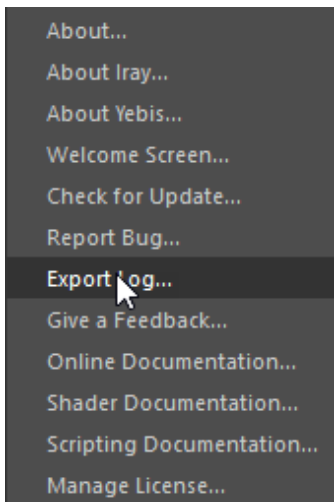
If you are unable to launch Substance Painter, you can retrieve the log file manually by going into the following folder :

- **Windows**: C:\Users*username*\AppData\Local\Allegorithmic\Substance Painter\log.txt
- **Mac OS**: Macintosh > Users > *username* > Library > Application Support > Allegorithmic > Substance Painter > log.txt
- **Linux**: /home/*username*/.local/share/Allegorithmic/Substance\ Painter\ 2/log.txt

On **Mac OS** "library" is a hidden folder.
On **Windows** "Appdata" is a hidden folder.
On **Linux** ".local" is a hidden folder.

Exporting a DXDiag

The DXDiag is a diagnostic created on Windows that gives information about your computer and your GPU setup.
Here are the steps to export when asked by the support team:

1. Go to Start > Run and type **"dxdiag"** (without quotes) in the **"Open"** field and press OK button
2. Wait for the **"green"** progress bar to finish loading and then press the **"Save All Information..."** button
3. Name the file with some useful info, like your name and the date, and save it where you can find it, like the Desktop, by pressing the **"Save"** button
4. Press the **"Exit"** button to quit this application

Technical Issues

Here are the most common technical issues and their solutions:

- Corrupted Texture error message
- Crash when opening or saving a file
- Crash with low virtual memory
- Error there is no disk in the drive
- Error with missing api-ms-crt dll
- GPU drivers crash with long computations
- GPU has outdated drivers
- GPU is not recognized
- GPU is not recognized and is mentionned as GDI Generic
- Impossible to drag and drop files into the shelf
- Impossible to use the ALT keyboard shortcut on Linux
- Link buttons do not work on Ubuntu
- Loading files from a network
- Running on integrated GPU
- Shelf is empty
- Shelf previews are empty
- Software conflicts
- Some HDPI scaling values are not working

Corrupted Texture error message

Corrupted textures in a project will cause failures during the saving process and can lead to projects being entirely corrupted and non-salvageable. However this can be manually fixed.
A corrupted resource manifests itself in the log when opening a project with an error message similar to this one in the log window :

```
[ResourceImage] Failed to load image content from file. (The texture has been corrupted)
file:///C:/Users/...... /Downloads/corrupted version.spp/resources/b5098bc0c3eaa65112442a15856616808b107ae4.image
```
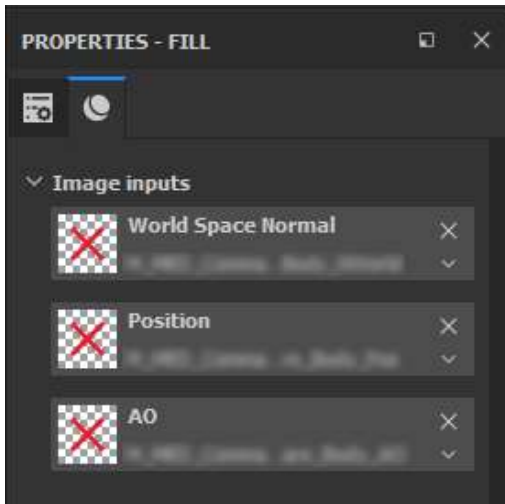
Fixing a corrupted resource reference

1 - Finding the resource

The first step when an error appears it to find and identify the problematic resource.
In most cases the culprit is from the **Mesh maps** (baked textures). A quick way to verify that is to look at the mask generators in the layer stack.

Corrupted resources will look like this:

> This could also mean that the resource is simply missing.
> To make sure, try clearing the slot and manually re-affecting the bake. If the red cross thumbnail is still here it means the resource is corrupted.

2 - Replacing the resource

To replace a corrupted resource, all the references to it must be removed first. If the current is relatively small, this can be done manually.
However if the project spans across multiple texture sets or lots of layers, the Resource Updater can be helpful to locate the corrupted resource and replace it temporarily with another one.

> - In the cased of the baked textures, don't forget to also clear the Mesh Maps slots in the Texture Set Settings window.
> - Bakes that are only used in the Texture Set Settings like the normal map could also be corrupted. Try removing them as well if errors persist.

3 - Cleanup

Once all references to the corrupted resources are gone, perform a Clean of the project from the main menu (**File** > **Clean**).
This should remove all the now unused corrupted resources from the Project. It is possible to verify by browsing to the Project tab in the shelf to make sure all the problematic resources are gone.

4 - Save

After the cleanup, try saving the project :

- If it saves without error the project is now free from corruptions (Mesh maps can now be rebaked and resources reimported).
- If errors remain this means there is still a reference to a corrupted resource in the project.

Crash when opening or saving a file

There are a few reasons why Substance Painter would crash on Windows, usually because of the following situations:

- There is a custom theme installed / There is custom shell extensions installed
- There is a conflict with a specific software, see: Software conflicts

Shell extensions/Custom theme

Custom themes are not supported by our GUI framework, therefore it is highly recommended to uninstall the current theme before using Substance Painter.

Alienware/**Dell** computers integrate by default some shell extensions that are known to be incompatible with Substance Painter. We recommend to uninstall them. While we do not know exactly all the extensiosn that are incompatible, most of the time they correspond to:

- DBROverlayIconBackuped.DBROverlayIconBackuped Class
- DBROverlayIconNotBackuped.DBROverlayIconNotBackuped Class

You can see which extensions are installed on your computer by using the following tool. Here is a rough procedure on how to proceed:

1. Download and install ShellExView from NirSoft: http://www.nirsoft.net/utils/shexview.html
2. Run the program
3. Click on **Option** and choose **Filter By Extension Type**
4. Select **Icon Overlay handler**
5. You should see the two entries for **Alien Respawn**.
6. Select **both** and click the red button to disable them.

Crash with low virtual memory

Substance Painter can be unstable if the **paging** file (**swap** memory/**virtual** memory) is set with a value **too low**.
It is advised to let the Operating System handling these settings (which is normally the case by default). Substance Painter requires a **minimum** of **16GB** of virtual memory in order to work properly.

How to change the virtual memory size on Windows ?

> Changing the virtual memory size on Windows will require a restart of the computer.

Access the virtual memory settings with the following steps

1. Right-click on the "**Computer/This PC**" icon and choose "**Properties**"
2. Select "**Advanced System Settings**"
3. Click on the "**Settings**" button of the "**Performance**" section
4. Click on the "**Advanced**" tab
5. Click on "**Change**" in the "**Virtual Memory**" section

Now it is possible to either:

- Enable the checkbox "**Automatically manage paging file size for all drives**"

or

- Select the hard drive where you want to change the virtual memory size and choose "**System managed size**" and click on the "**Set**" button.

Automatic:
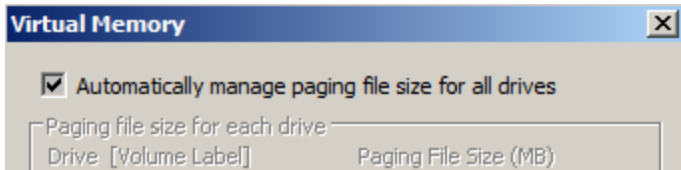
Manual:
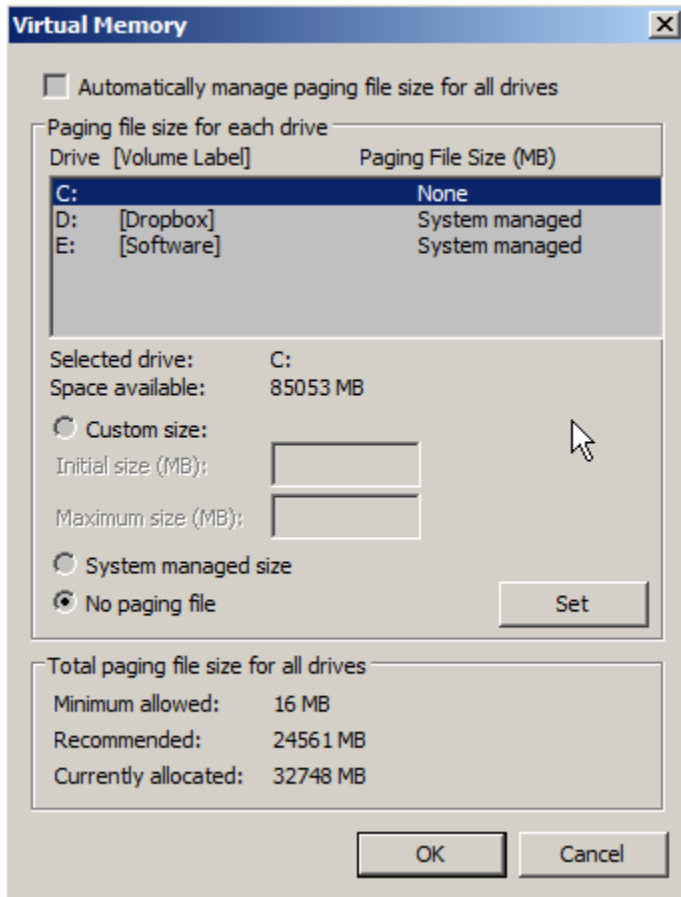
Error there is no disk in the drive

On Windows, you can sometimes encounter this error:

"There is no disk in the drive. Please insert a disk into drive X."
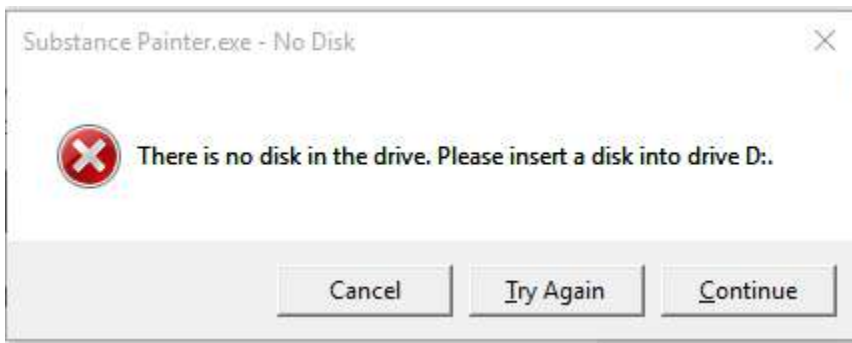
There are a few things to check to get rid of this error:

- Verify that your drive letters setup is correct (see https://support.microsoft.com/en-us/kb/330137)
- Verify that any previous location used in Substance Painter is valid (like the "recent Files" list)

Error with missing api-ms-crt dll

Substance Painter cannot start because **api-ms-win-crt-runtime-l1-1-0.dll** is missing from your computer.
This is most likely because the update KB2999226 which is part of the **Visual C++ Redistributable** for Visual Studio 2015 failed to install.

How to fix the issue ?

1 - Verify that Windows is up to date

1. Open the Start menu
2. Select Control Panel
3. Click on **Windows Update**
4. Click on **Check for updates**
5. **Install** all available updates.
6. After the updates are installed, **restart** your computer.

After the restart repeat the steps above again until no more updates are available.

2 - Install Visual C++ Redistributable

1. Download the Visual C++ Redistributable :
    1. For Windows 64-bit
    2. For Windows 32-bit
2. Run the **vcredist_x64.exe** (64-bit) or **vcredist_x86.exe** (32-bit)
3. Select Uninstall and follow the procedure
4. Run the executable again
5. Select Install

GPU drivers crash with long computations
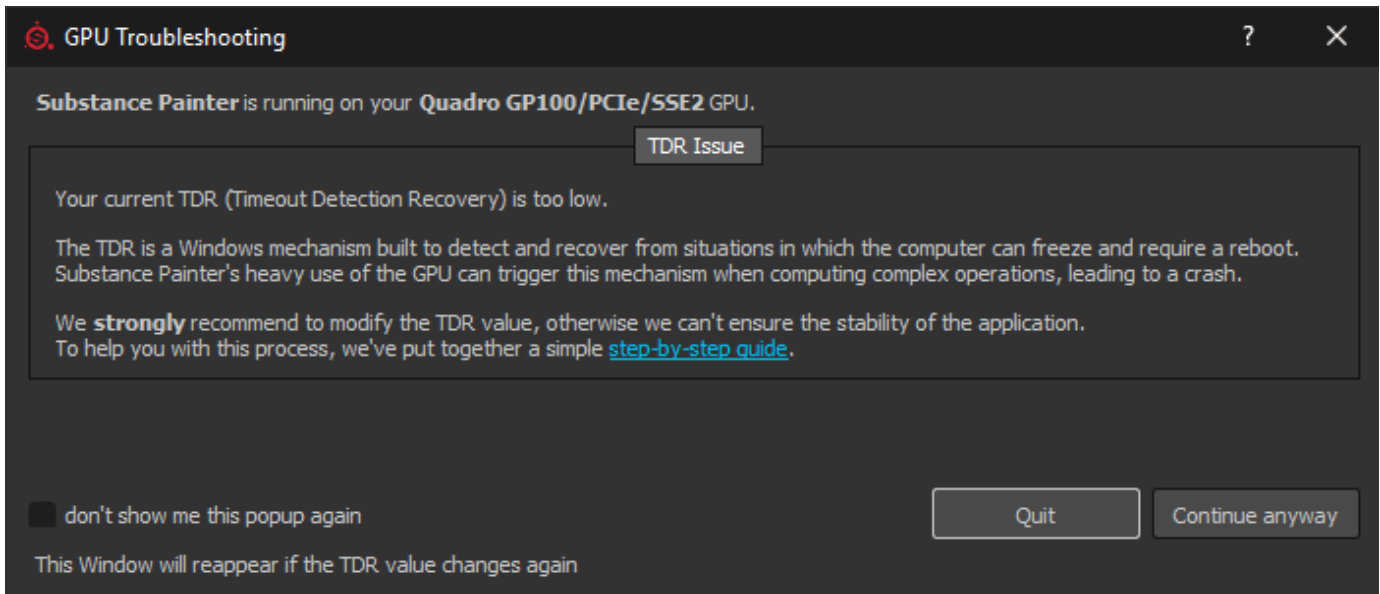
Under **Microsoft Windows**, this window will appear if Substance Painter detects that the current TDR value is below a specific limit (10 seconds).

Why does the GPU driver crash ?

In order to prevent any rendering or GPU computation from **locking the system**, the **Windows** Operating System **kills the GPU driver** whenever a rendering takes **more than a few seconds**. When the driver is **killed**, the application using it **crashes automatically**. Since **we can't possibly know** how long a rendering or computation will take (it depends on the GPU, the drivers, the OS, the mesh size, the texture size, etc.), we cannot put a limit on how much the computer can process and avoid the crash.

On Windows there is a **key in the registry** specifying **how long** the OS should wait before killing the driver call. Application are not authorized to modify this setting directly, this procedure **has to be done manually** (see below).
You can find more details about it here : https://docs.microsoft.com/en-us/windows-hardware/drivers/display/tdr-registry-keys

What Keys need to be changed ?

You can change the TDR values in two ways :

- Increasing the TDR Delay (this is the safest manipulation) -> Change both "**TdrDelay**" and "**TdrDdiDelay**" to a higher value (like 60 seconds).
- Disabling the TDR completely -> Set "**TdrLevel**" to 0 (*not recommended*).

Name	Type	Data
ab (Default)	REG_SZ	(value not set)
DxgKrnlVersion	REG_DWORD	0x00002005 (8197)
TdrDdiDelay	REG_DWORD	0x0000003c (60)
TdrDelay	REG_DWORD	0x0000003c (60)
TdrLevel	REG_DWORD	0x00000001 (1)
UnsupportedMonitorModesAllowed	REG_DWORD	0x00000001 (1)

How to edit the TDR values of the Registry ?

Follow this procedure to change the TDR value.

Note that <u>two different</u> keys will have to be created/edited.

> Please note that editing the registry can have serious, unexpected consequences that can prevent the system from starting and may require to reinstall the whole operating system if you are unsure of how to modify it.
> Allegorithmic takes no responsibility for any damage caused to your system by modifying the system registry.

1 - Open the Run window

Click on **Start** then **Run** or press the **Windows** and **R key**.
It will open the **Run** window.
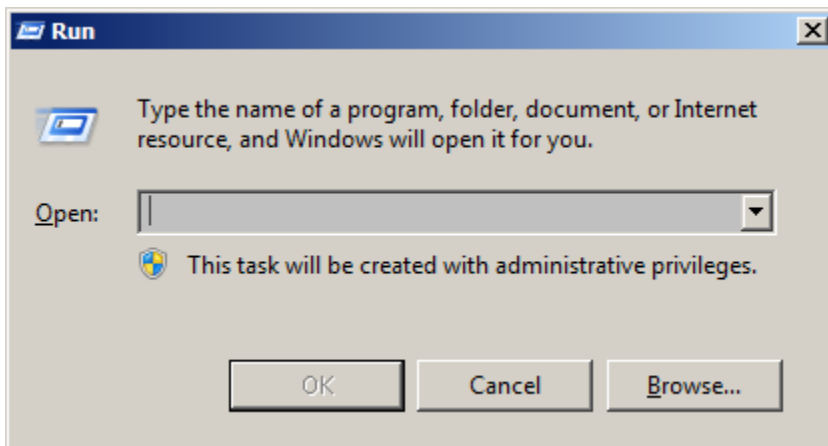
2 - Launch the registry editor

Type "**regedit**" in the text field and press "**OK**".
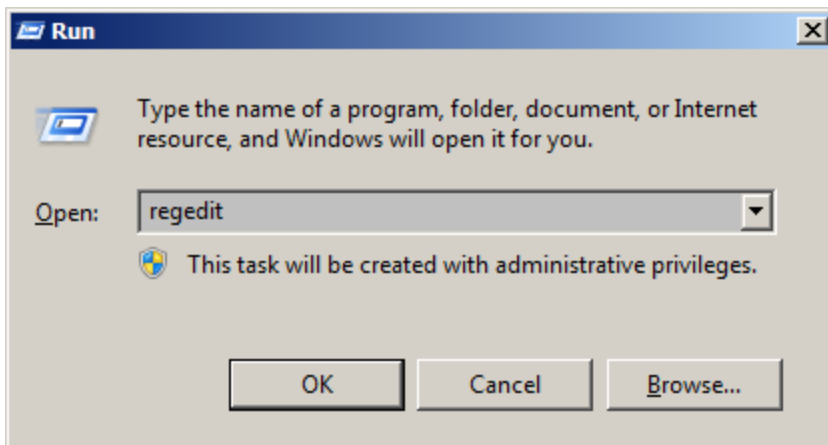
3 - Navigate to the GraphicsDrivers registry key

The registry window will open.
In the left pane, navigate in the tree to the **GraphicsDrivers** key by going into: **Computer\HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\GraphicsDrivers**

> Be sure to **stay on** "GraphicsDrivers" and **to not click** on the Registry **keys below** before going through the next steps.

4 - Add or Edit the TdrDelay value

If the **TdrDelay** value **doesn't exist yet**, right-click in the right pane and choose **New > DWORD (32bit) Value**. Name it "**TdrDelay**". The case if important, be sure to follow it (and check that there are no other characters such as spaces).

In the **right pane**, double click on the value **TdrDelay**. Change the **Base** setting to **Decimal**. Set the value to something else than the default **2** (we recommend **60**).
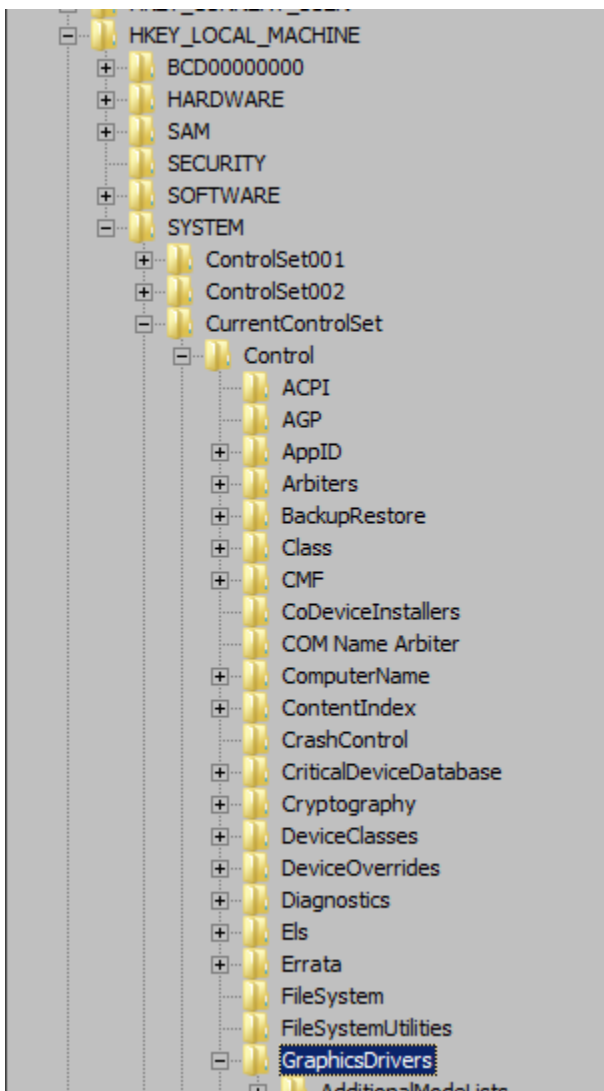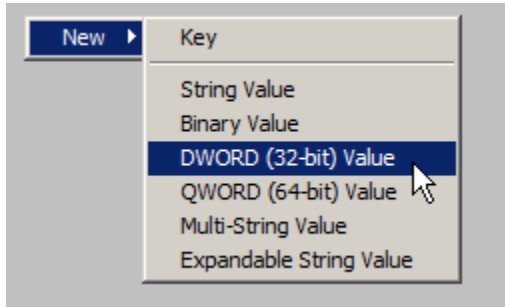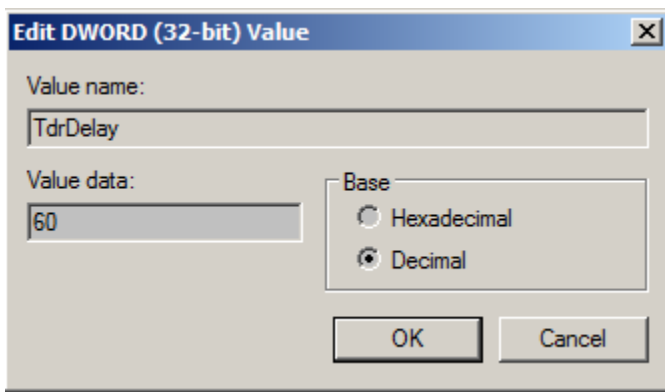
This value indicates in seconds how long the operating system will wait before considering that the GPU is unresponsive during a computation.

5 - Add or Edit the TdrDdiDelay value

If the **TdrDdiDelay** value **does not exist**, right-click in the right pane and choose **New > DWORD (32bit) Value**. name it "**TdrDdiDelay**". The case if important, be sure to follow it (and check that there are no other characters such as spaces).
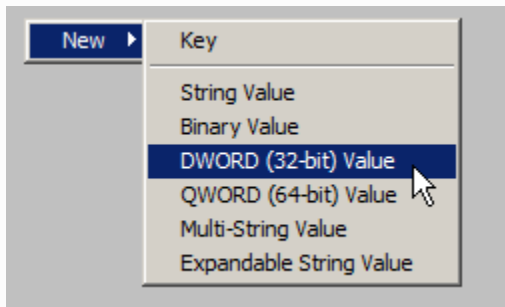
In the **right pane**, double click on the value **TdrDdiDelay**. Change the **Base** setting to **Decimal**. Set the value to something else than the default **5** (we recommend **60**).

This value indicates in seconds how long the operating system will wait before considering that a software took too much time to leave the GPU drivers.

Hexadecimal is the default value, simply switch to **decimal** to display the right value. Note that **3C** (Hexadecimal) equals to **60** (Decimal).

The right pane should now looks like this :

Close the Registry editor. **Restart** the computer by using **Start** then **Restart**.

The TdrValue is only looked at when the computer start, so to force a refresh a reboot is necessary.

> If Substance Painter still crashes when doing a long computation, try increasing the delay (in seconds) from 60 to 120 for example.

How to revert the TDR to its default values ?

There are two ways to revert the TDR to its default values :

- Set the **TdrDelay** to **2s** and the **TdrDdiDelay** to **5s**, by following the steps described aboves
- Or **Remove** the **TdrDelay** and **TdrDdiDelay** keys from the registry entry

GPU has outdated drivers

When launching Substance painter a pop-up window can appear mentioning that your drivers are outdated.
This message simply means that we recommend a certain version of drivers for this specific brand of GPU.
Note however that new drivers may not be available for your GPU model.

- **nVidia**: http://www.nvidia.com/Download/index.aspx
- **AMD/ATI**: http://support.amd.com/en-us/download
- **Intel**: https://downloadcenter.intel.com/
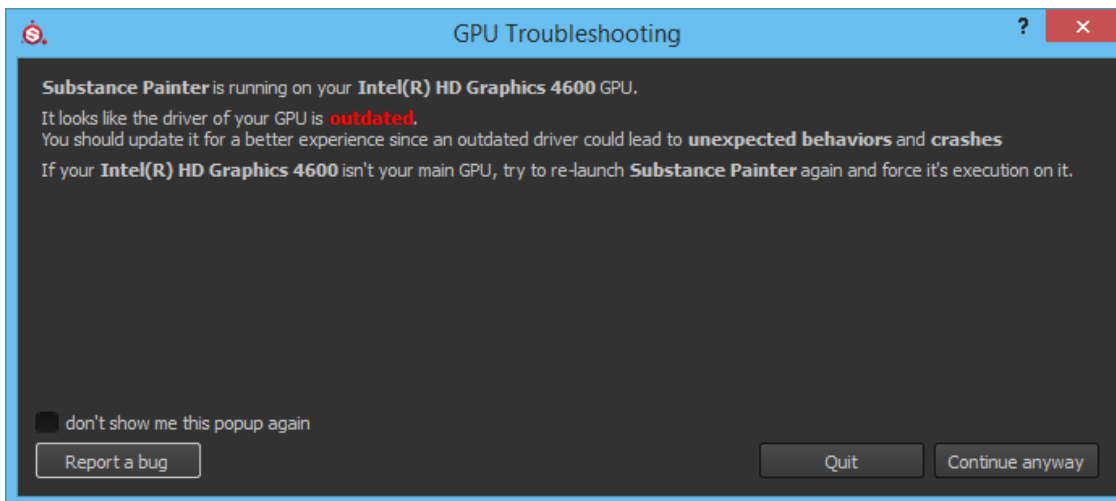
GPU is not recognized

Some **nVidia Optimus** users can have troubles getting Substance Painter to run on the right GPU. A workaround is to set the following keys in the Registry of Windows to 0:

- HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows NT\CurrentVersion\Windows\RequireSignedAppInit
- HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\Microsoft\Windows NT\CurrentVersion\Windows\RequireSignedAppInit
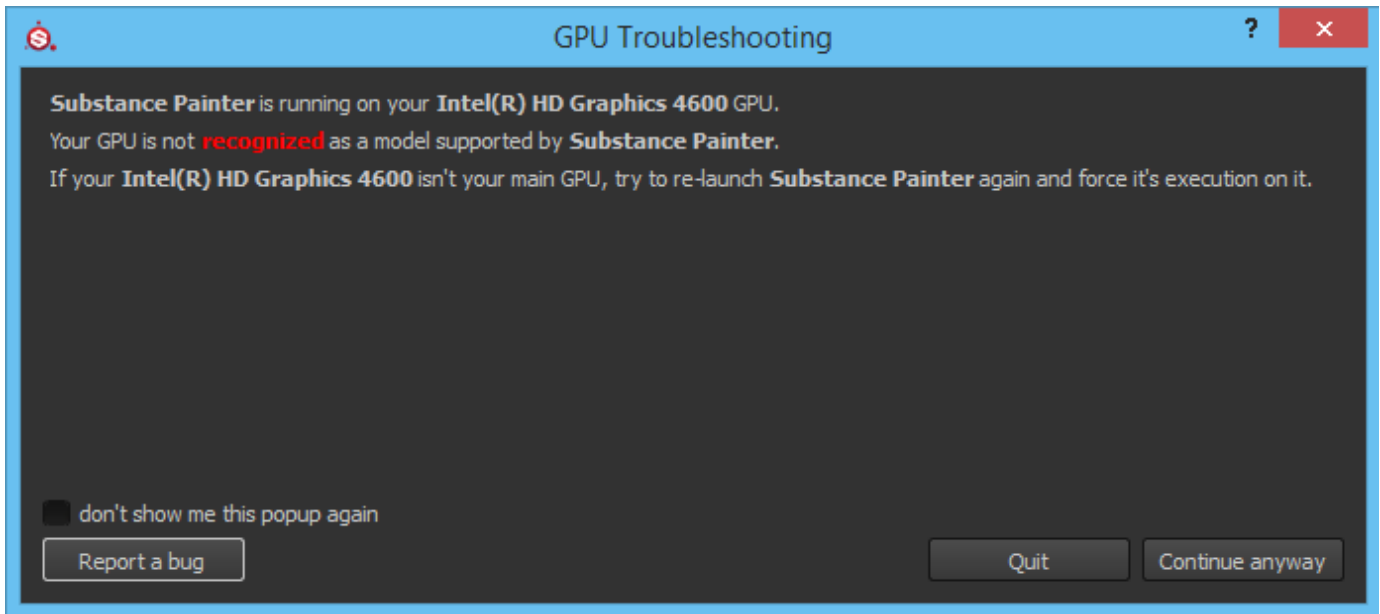
GPU is not recognized and is mentionned as GDI Generic

This issue is a bit complicated to track and can be caused by multiple sources:

- If you are on a computer with Nvidia Optimus, see the following link: GPU is not recognized
- Check that your monitor is connected to your primary GPU (and that on Windows this monitor is set as your main display)
- Check that the color bit depth of your main display is set to 32 bits on Windows
- If you still have issues, try a clean reinstall of your GPU drivers (full uninstall with cleaning of the remains in the Windows registry).

Impossible to drag and drop files into the shelf

On **Windows 8 and Windows 10**, if you run Substance Painter in administrator mode, the security level of the software will be probably higher than the security level of the Windows Explorer. Therefore Microsoft does not allow to drag and drop files between those applications.

To fix this issue you can either :

- Run Substance Painter normally (without administrator rights).
- Disable the UAC (this is not recommended).

Impossible to use the ALT keyboard shortcut on Linux

If you are running a Linux distribution (**Ubuntu** or **CentOS**) which use **Gnome** as user interface, you might want to disable the default behavior of the **ALT** key to be able to navigate in the viewport of Substance Painter.

Changing the ALT key on CentOS

1 - Go to **System > Windows**
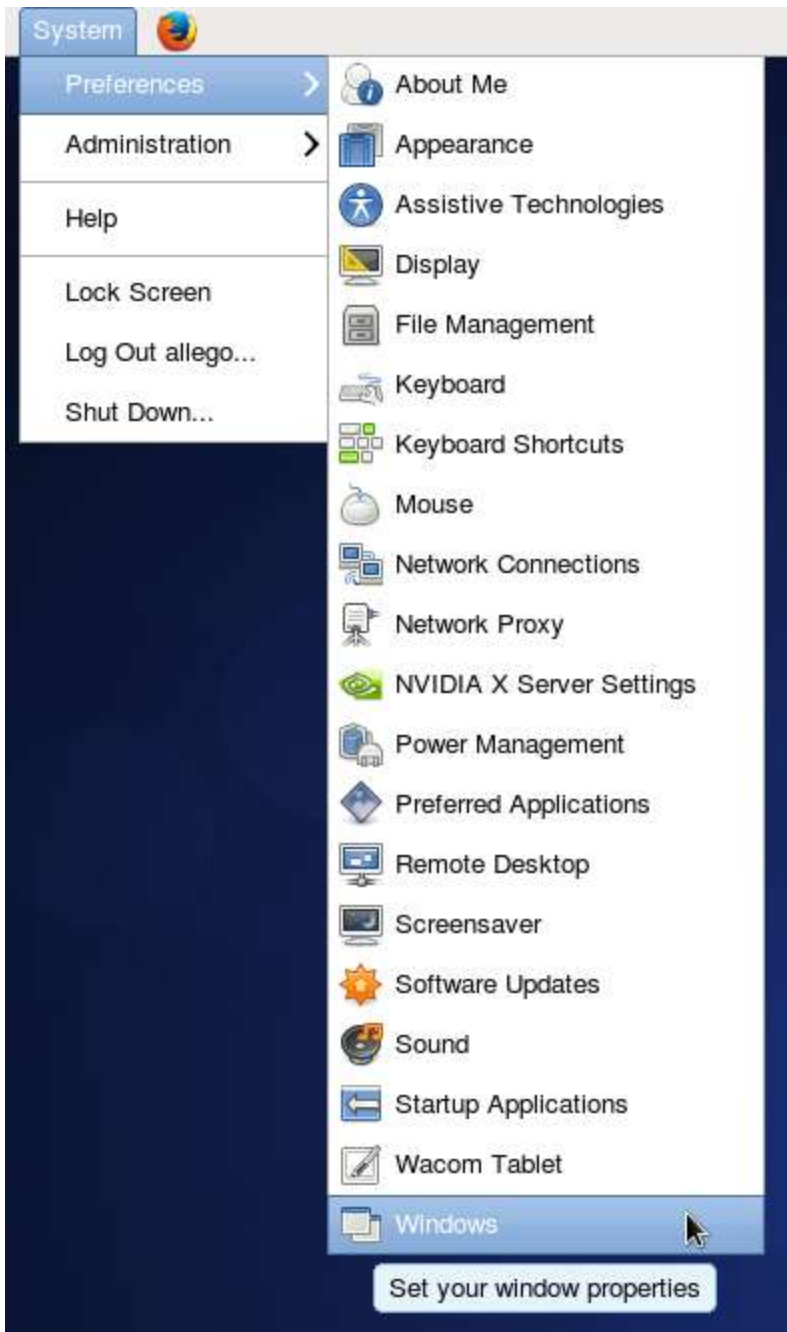
2 - Change the "movement key" setting to something else than "**Alt**". For example use "**Super**" (to choose the "Windows" key of your keyboard).
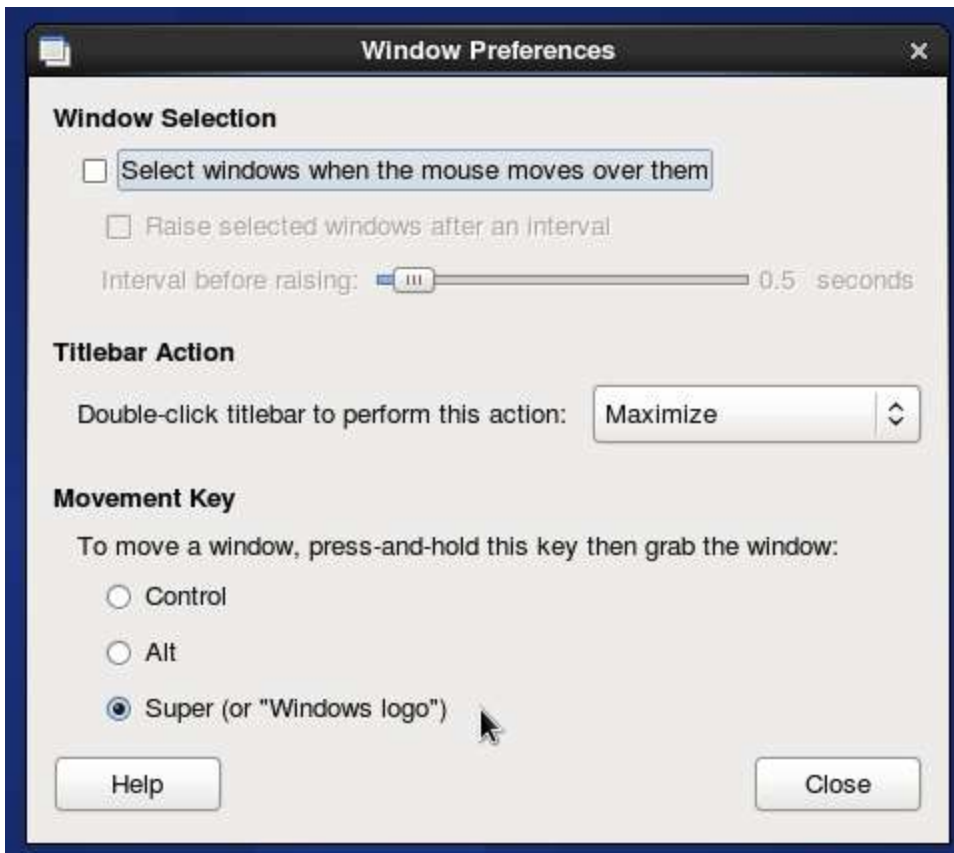
Changing the ALT key on Ubuntu

1 - Open a terminal and run the following command :

```
sudo apt-get install dconf-tools
```

This will install an advanced configuration tool, you might have to allow additional dependencies to be installed to be able to run it.

2 - Open the start menu and look for "**Dconf-tools**". Launch it.

3 - Expand the tree menu on the left by going to the following route : **org > gnome > desktop > wm > preferences**

4 - Edit the "mouse-button-modifier" and change it value. Set it "**<Super>**" or "**<Alt><Super>**" instead, but *don't leave it empty*. Super is an equivalent to the "Windows" key.
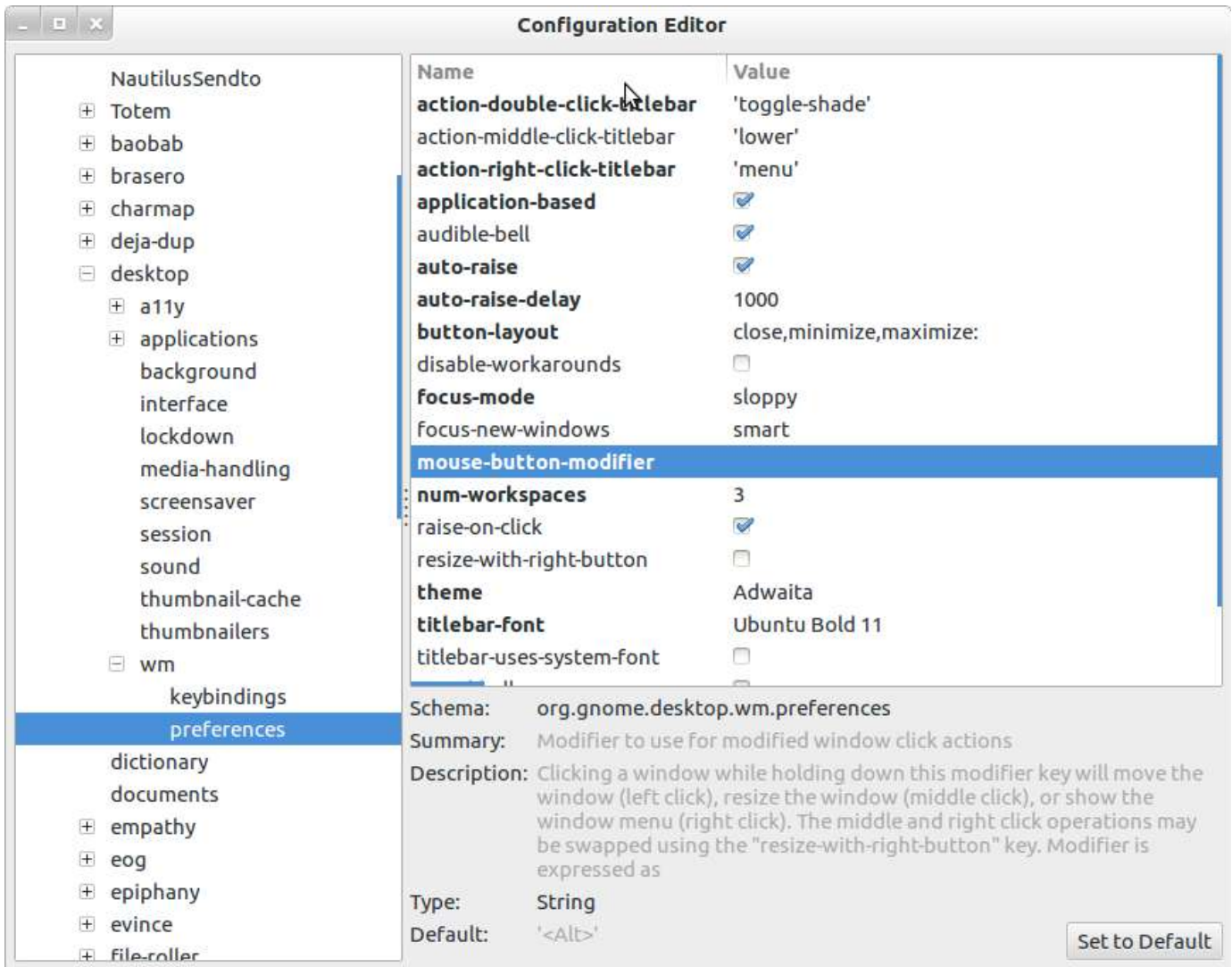
Link buttons do not work on Ubuntu

When running Substance Painter on Ubuntu via Steam, some buttons that should open an URL (web page) might not work.
A workaround to this issue is to enter a command in the properties of your application to enable these buttons back again.

Setup of the command

1 - Right-click on the application in Steam and choose "properties"
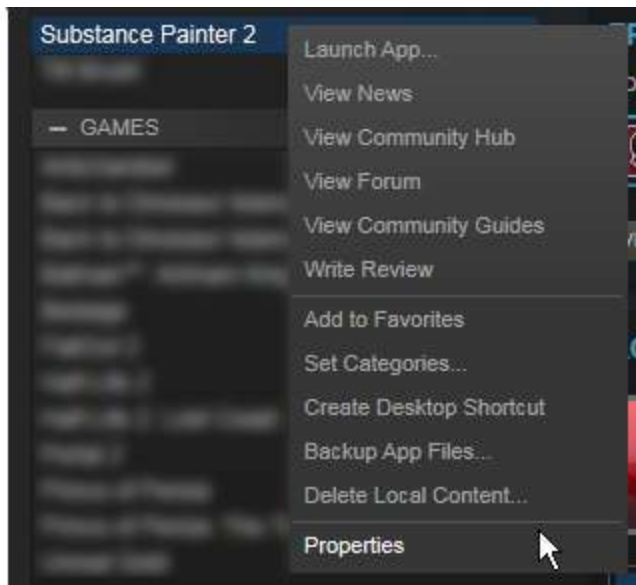
2 - Click on "Set Launch Option..."
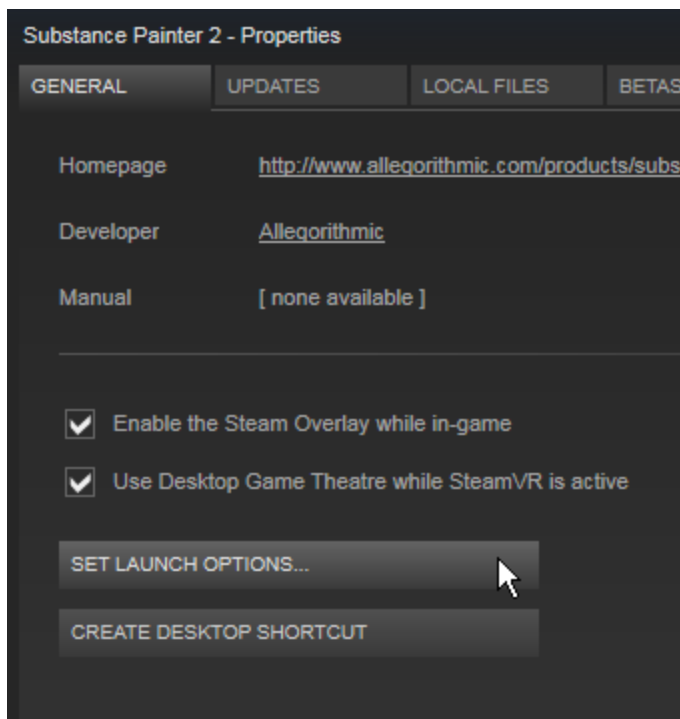
3 - Enter the following command in the text field, then press OK and close the properties window.

```
LD_LIBRARY_PATH="$SYSTEM_LD_LIBRARY_PATH" %command%
```
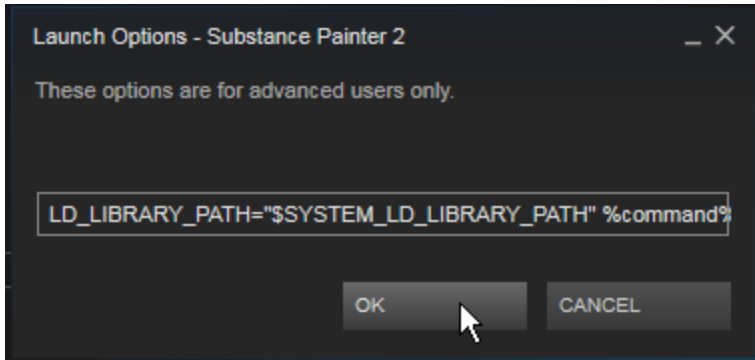
Loading files from a network

Substance Painter doesn't support networked paths because this require an **account authentification**, which the software can't do.
Therefore the paths must be **mapped**/**mounted** by the operating system.

- **Windows**: http://www.laptopmag.com/articles/map-network-drive-windows-10
- **MacOS**: http://osxdaily.com/2010/09/20/map-a-network-drive-on-a-mac/
- **Linux**: http://superuser.com/questions/145191/how-do-i-map-a-drive-network-share-using-the-linux-terminal

Running on integrated GPU

It can happens that some computers are set by default to run on an integrated chipset rather than on a dedicated GPU.
Since performances on integrated chipset are very low, we recommend to use a dedicated GPU instead. A pop-up can appears and warns you about it.

With an NVIDIA GPU, the switch to the NVIDIA GPU depends on application profiles. If an application does not have such profile, you can assign the graphics card manually:

1. Right-click on the Desktop and select NVIDIA Control Panel **or** Navigate to the Control Panel and search for NVIDIA Control Panel
2. Under **3D Settings**, go to **Manage 3D Settings**
3. Under the tab **Program settings** add a new profile for **Substance painter**
4. Change the preferred graphics processor setting to High-performance NVIDIA processor
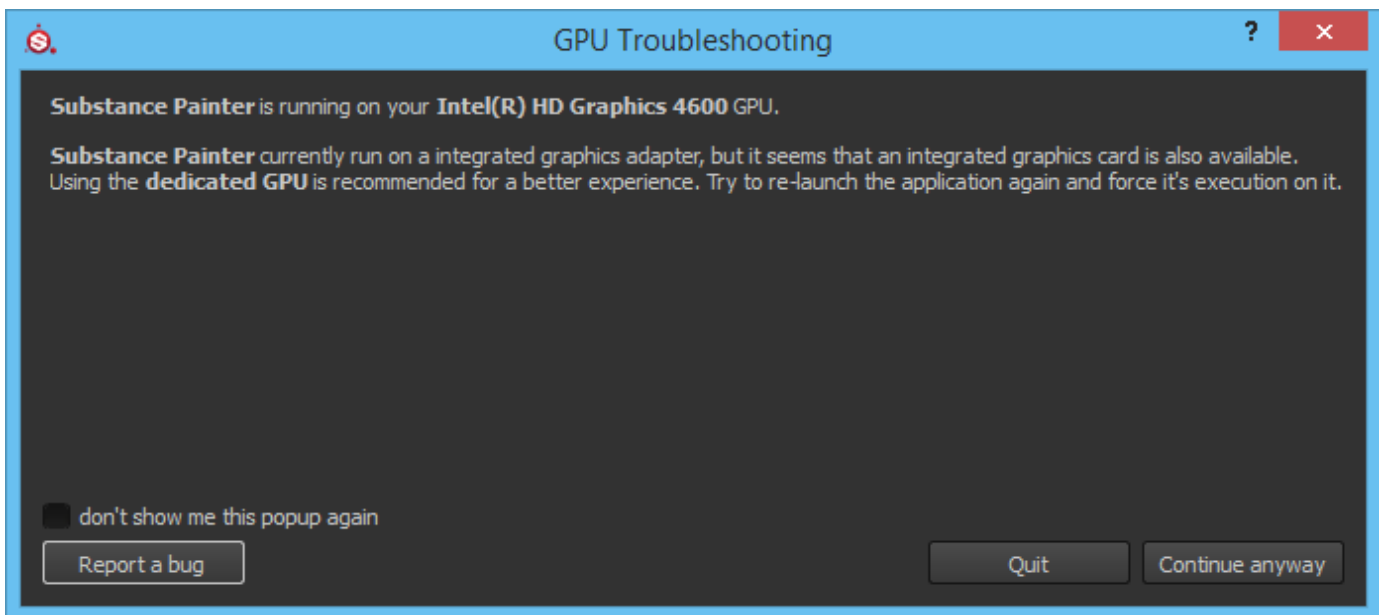
Shelf is empty

This page is not relevant anymore since **Substance Painter 2.4**.
Since this version, the shelf is not copied anymore into the user "Documents" folder. Therefore all the resources should appear properly.
If the default content is still not appearing, lauching the application in "**administrator**" mode might help.

It can happen sometimes that the content of shelf provided with Substance Painter is not installed properly. Therefore some brushes, materials and other types of resources can be missing when you start Substance Painter. An easy way to fix it, is to simply delete a folder manually in order to force Substance Painter to reinstall the shelf.

Just try to delete the "Allegorithmic" shelf folder and then restart Substance Painter. You can find the folder at the following path :

Windows: C:\Users*username*\Documents\Substance Painter (2)\shelf\allegorithmic
Mac OS: Macintosh > Users > *username* > Documents > Substance Painter (2) > shelf > allegorithmic

Shelf previews are empty

This issue can be caused by other software, see: Software conflicts

If it is impossible to determine which software updating/uninstalling, look for an environnement variable named "QT_PLUGIN_PATH" and remove it.

On Windows:

1. Open **System** in Control Panel.
2. On the Advanced tab, click **Environment Variables**
3. Look for the variable named **"QT_PLUGIN_PATH"**
4. **Remove** it
5. **Restart** your computer

Software conflicts

Here is the list of the known issues with other existing software. Usually leading to a crash of Substance Painter :

Anti-Virus / Anti-Spyware

In general, some anti-virus or anti-spyware softwares can report false positives with Substance Painter and block some files of the application (or even delete some of them). This makes the application unable to start and sometimes necessary to reinstall it. Those softwares can also block the license system, making it impossible to activate the license itself. We recommend in this situation to try disabling them temporarily to see if it helps or even manually add exceptions. They can also block Substance Painter from writing inside a folder, producing conflicts and errors when trying to save presets (such as smart-materials).

We ensure that our applications are virus-free. So if the installer has been downloaded from our official website, any warning is probably a false positive.

AMD CrossFire / NVIDIA SLI

Multiple GPU configurations are unsupported by Substance Painter, leading to crash during computations. We recommend to disable this feature.

Autodesk assistant application

The Autodesk assistant application can create conflict Substance Painter and make it crash at startup or when opening a project file. Update the Autodesk application to resolve the problem.

Alienware / Dell computer

See this page for more information : Crash when opening or saving a file

Avecto

Having an older version of Avecto running can cause slowdowns and crashes. Make sure you update it to the latest version.

Nahimic audio software

On some other **Dell** computers the **Nahimic** audio software can freeze the application. Stopping it can help, it is also possible to avoid issues by updating it.

Rptr / Plays.tv

On computers with an AMD GPU, there is a software named **Rptr** (or **Plays.tv**) which is installed by default with the GPU drivers. This software can create instabilities and crash Substance Painter. It is recommended to uninstall it.

Asus Sonic Suite

On some computers with an ASUS Motherboard, a software named "**Asus Sonic Suite**" can be installed. Uninstalling this software can fix some display/interface issues in Substance Painter.

Openshot Video Software

Some software such as "**Openshot Video Software**" can create a conflict with Substance Painter with the previews of the shelf. We recommend to update the software to fix the issue.

Duet Display

The application **Duet Display** is known to create GPU drivers issues that can impact the behavior of Substance Painter. It is recommended to uninstall it.

Some HDPI scaling values are not working

On Windows, some HDPI scale values (used to scale the interface on monitors with high resolutions) may not work properly.
This is because our window framework (Qt) does not support them. We are unable to fix it until it is actually managed by the providers of the framework itself.

Therefore here is the behavior you may encounter depending of your settings :

* 120 DPI (**125%** scaling) - rendered as 96 DPI (**100%** scaling)
* 144 DPI (**150%** scaling) - rendered as 192 DPI (**200%** scaling)
* 168 DPI (**175%** scaling) - rendered as 192 DPI (**200%** scaling)

For more details, see : https://bugreports.qt.io/browse/QTBUG-55654

Workflow Issues

Here are the most common workflow questions and their solutions :

* A project has been processed as a text file and is now corrupted
* My exported opacity map is totally black
* Normal map looks incorrect when loaded in layer or tool properties
* Preserve brush strokes setting stays disabled
* Projects are really big
* Thumbnails in the shelf look incorrect

A project has been processed as a text file and is now corrupted

Sometimes the following error can appear when loading a project :

```
[Hdf5Archive] Archive 'project.spp' appears to have been processed as a
text file and is irremediably corrupted.
[Project management] The selected project 'project.spp' isn't valid!
```

This error means the project has been modified outside of Substance Painter and **cannot be read back properly**.
It usually happens when a versioning software (such as **Perforce**) processed the Substance Painter project **as a text file instead of a binary file**.
The only solution is to add a new rule/exception to the versioning software to force the processing of **spp files as binary**. For more information with **Perforce**, see the dedicated documentation : https://www.perforce.com/perforce/r16.1/manuals/cmdref/p4_typemap.html

My exported opacity map is totally black

When you create a new project, the default color comes from the shader and not the textures. Therefore, when you export all the parts that you didn't paint they will be black with an alpha value set at 0 (because no data exist on these parts).

The easiest way to fix this is to put a fill layer at the bottom of your layer stack : it will fill all the UVs with a default color, which is identical to the default color of the shader.

Normal map looks incorrect when loaded in layer or tool properties

When loading a normal into the current tool of fill layer, this one can appear incorrect if it's an OpenGL normal map.
The reason is quite simple : the engine of Substance Painter assume that loaded normal map are DirectX by default.

This behavior can easily be edited by clicking on the little arrow next to the substance material or the dedicated channel:
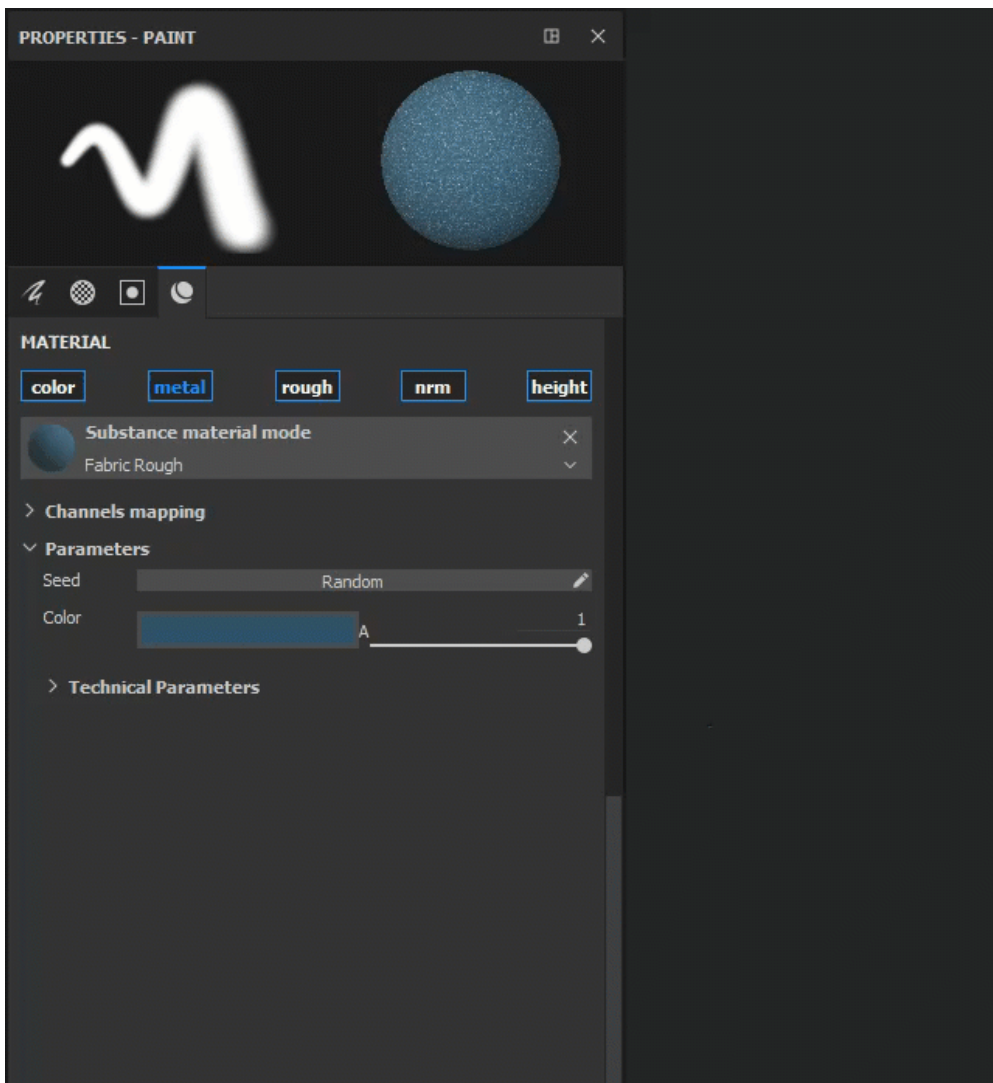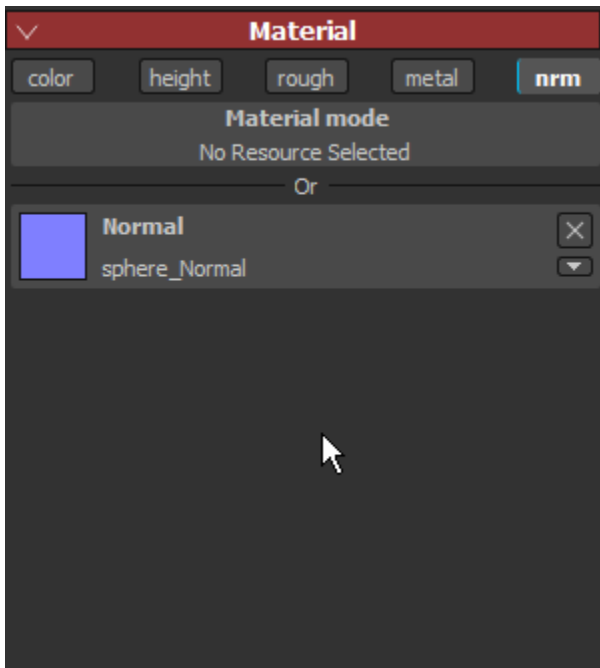
Preserve brush strokes setting stays disabled

Because of an unfortunate bug introduced in Substance Painter 1.5 (partially fixed in 1.7) some projects have lost metadata related to the mesh. This bug makes therefore the "Preserve strokes positions on mesh" setting in the Project configuration window to stay disabled.

To solve the issue some specific steps need to be followed :

- Open the project with the issue in Substance Painter 1.7 or superior
- Go to Edit > Project Configuration
- Select and re-import the original mesh that you used in the current project (not the updated version)
- Validate and let Substance Painter compute the layers, nothing should change if it's the same mesh
- Go again to Edit > Project Configuration
- "Preserve strokes positions on mesh" should now be enabled again, allowing you to import the new mesh

Projects are really big

Everything you use in a Substance Painter project is included into the file:

- the source mesh,
- the textures baked,
- the materials (like substances),
- bitmaps or other resources used by any layers/preset/brush stroke.

It makes the project completely autonomous but the downside is indeed a large file size. The decision to have everything embedded into the project file comes from the fact that everything is non destructive. It means that the project "rebuilds" itself when you open it. If a single brush or material is missing from your shelf, the project will break and will not be able to correctly regenerate.

> The high-poly meshes are not included in the project. They are just linked to the project.

A way to reduce the filesize is to :

- Use the "clean" then "save" function in the file Menu to get rid of unused resources to also compact your file on the disk.
- Set your texture set to a lower resolution, like 512, to reduce the disk footprint of the cached textures used for the visualization of the texture sets.

> On Windows, the project file is protected from read/write access, therefore the size in the Windows Explorer can be incorrect until you close the project in Substance Painter.

Thumbnails in the shelf look incorrect

If the thumbnails in the shelf appear to be different than habitual it may be because of the shader used to render the previews.

Broken thumbnails	Normal thumbnails
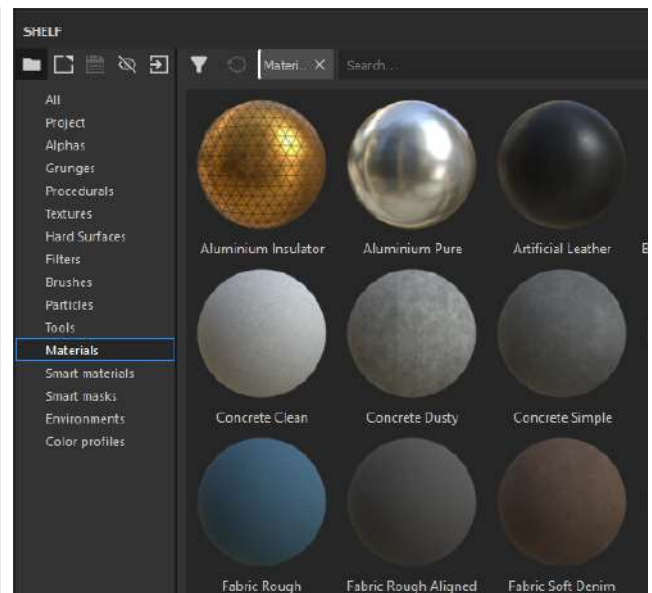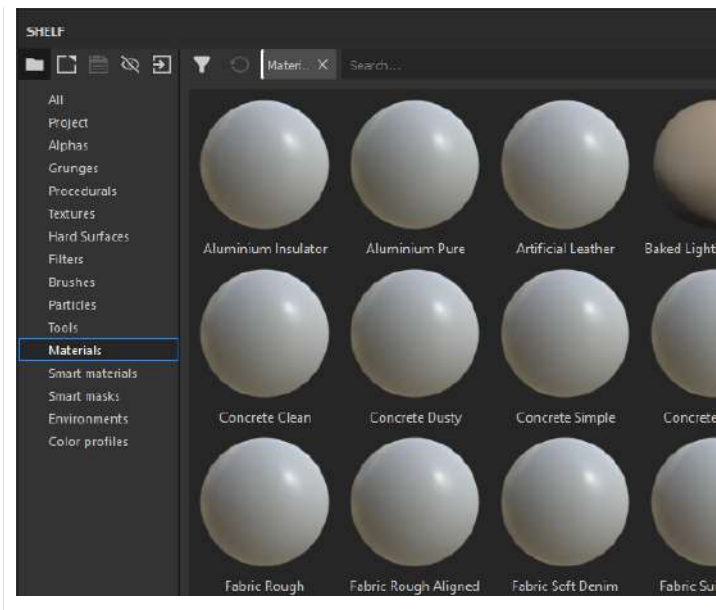
1 - Open the main settings window

Go to **Edit** and click on **Settings** :
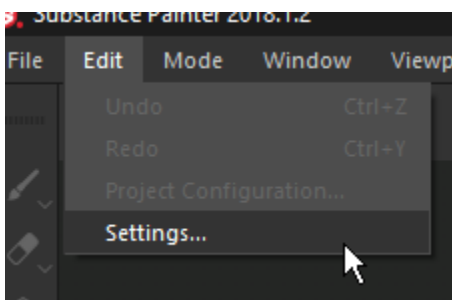
2 - Remove the Shelf preview shader

In the **General** view scroll down until the "Preview options" section is visible.
Click on the **cross** button in front of the "**Material preview shader**" to remove the current shader specified.
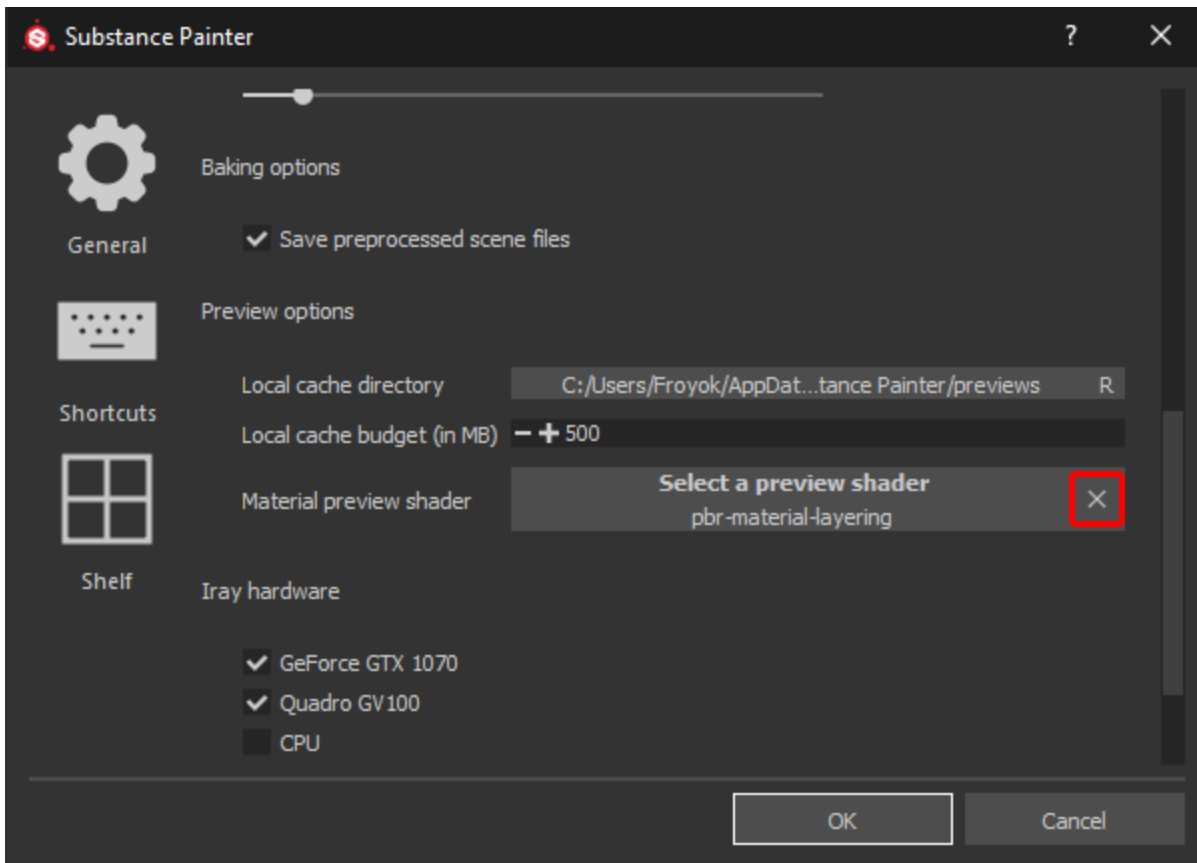
3 - Restart Substance Painter

In order to regenerate the thumbnails so that they can look correct Substance Painter needs to be restarted.

Configuration

Here are some advanced way of configuring Substance Painter:

- Adding shelf paths by editing preferences manually
- Adding shelf presets manually
- Application preferences location
- Automated Installation
- Querying Current Software Version
- Retrieving Installation Path

Adding shelf paths by editing preferences manually

It is possible to add additional custom shelf paths by editing the preferences of Substance Painter without opening the application.
To do so, it requires to edit manually the application preferences. Once added, the new shelf should appear in the shelf list in the main preferences. See this page for more details : Shelfs

> Substance Painter doesn't support network path, be sure to use a mounted path instead to avoid any issues. See : Loading files from a network

Adding a path on Windows

On Windows additional shelf paths can be created via the Windows Registry.
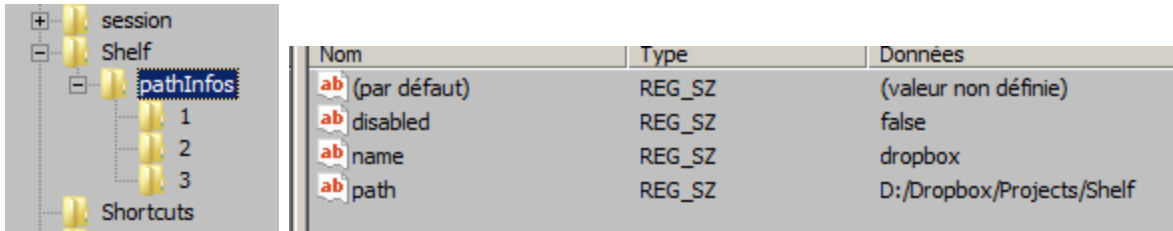
1. Click on **Start > Run** or press **Windows + R**.
2. Type "**regedit**" (without the quotes) in the dialog and press **OK**.
3. Navigate in the tree view on the left of the **Registry Editor** window and go to : **HKEY_CURRENT_USER\Software\Allegorithmic\Substance Painter 2\Shelf\pathInfos**
4. **Add a Key** below "**pathInfos**" with a **number** as a name. Increment the number based on the already existing keys (starting at 1).
5. Do a **right-click** > **new** > **String value** in the right part of the window. Name it "**disabled**" and set the value to "**false**".
6. Do a **right-click** > **new** > **String value** in the right part of the window. Name it "**name**" and enter the name of the custom shelf.
7. Do a **right-click** > **new** > **String value** in the right part of the window. Name it "**path**" and set the value to path where the shelf is located.
8. Don't forget to increment by 1 the key "**size**" within "**pathInfos**".
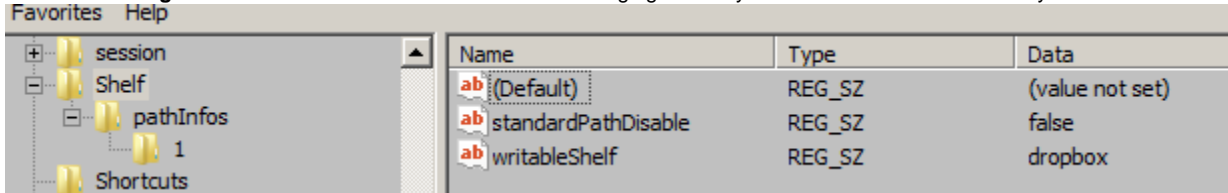9. Close the windows.
10. Start Substance Painter.

It is possible to define your new shelf path as the default one (were new ressource are created, like presets) by going to **HKEY_CURRENT_USER\Software\Allegorithmic\Substance Painter 2\Shelf** and changing the entry "writableShelf" to the name of your new shelf.

Adding a path on Linux

On **Linux** additional shelf paths can be created via the user application preference config file, stored in the home directory.

1. Navigate to **/home/*username*/.config/Allegorithmic** (Note that **.config** is an hidden folder)
2. Open the file "**Substance Painter.config**"
3. Scroll down to the "**[Shelf]**" section

Add a new shelf path by increment the last number visible, example :

```
pathInfos\2\disabled=false
pathInfos\2\name=custom_shelf
pathInfos\2\path=/home/Username/Documents/Allegorithmic/Substance Painter
/custom_shelf_path
writableShelf=custom_shelf
```

Use the **writableShelf** variable to specify which shelf will be the default one (were new ressource are created, like presets).

Save the changes and restart Substance Painter.

Adding shelf presets manually

It is possible to add new shelf presets without opening Substance Painter by editing a configuration file.
The configuration file is named "**shelf.ini**" and can be located inside the following folder:

- **Windows**: C:\Users*username*\Documents\Substance Painter\
- **Mac OS**: Macintosh > Users > *username* > Documents > Substance Painter
- **Linux**: /home/*username*/Documents/Substance Painter/

Example of possible content :

```
[filters]
1\name=Grunge
1\usages=basematerial, smartmaterial, smartmask, filter, receiver, tool,
texture, procedural, brush, emitter, environment, particle, shader, alpha,
generator
1\refine_query=grunge
2\name=Procedural
2\usages=procedural
3\name=Environment
size=4
3\usages=environment
4\name=Filter
4\usages=filter
```

The syntax works like this :

- A number to define the current shelf preset : **1/**
- A variable name: **usages**
- The content of the variable: **=basematerial, smartmaterial, and so on**

The variable "**size**" is used to determine the number of custom presets that need to be read and loaded by the application.

Application preferences location

Some **parameters** specific to **Substance Painter** are located at a specific place in order to be reloaded during the next launch of the application. It can be useful to know where in case you want to add **custom shelfs** (for studios installations) or **removing** these preferences to perform a **clean installation** of the application.

Windows

On **Windows**, those preferences are stored in the **Registry**.

1. Click on **Start > Run** or press **Windows + R**.
2. Type "**regedit**" (without the quotes) in the dialog and press **OK**.
3. Navigate to the key : **HKEY_CURRENT_USER\Software\Allegorithmic**
4. Remove of edit the key **"Substance Painter"**
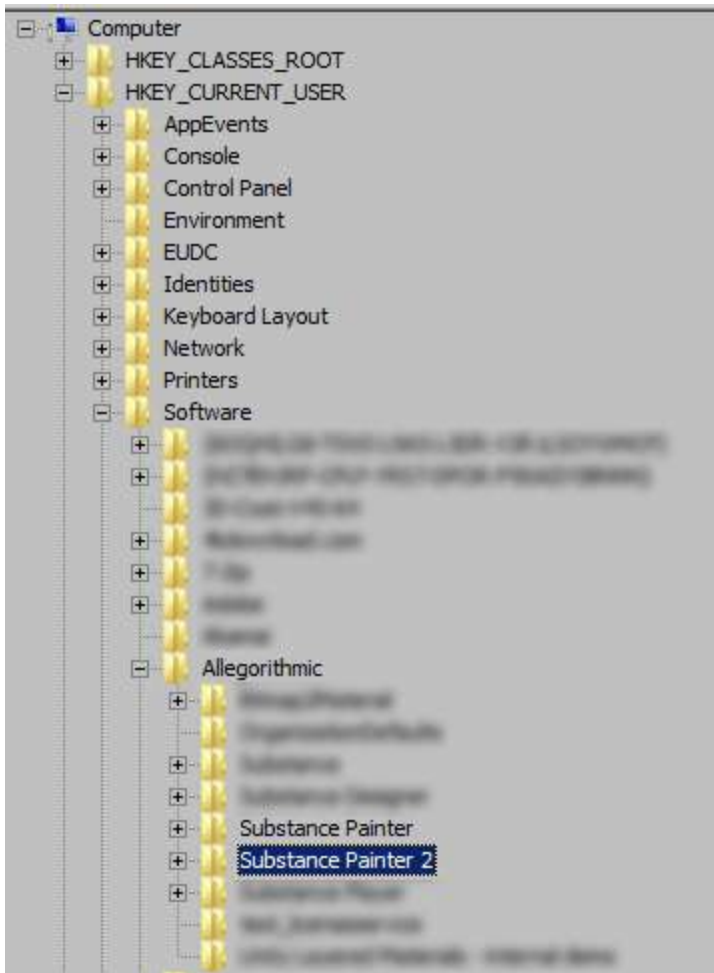
Mac OS

On **MacOS** the preferences are in the Library and can be removed via a command line :

1. Open a **Terminal**
2. Navigate to : **/Library/Saved\ Application\ State/com.allegorithmic.substance-painter.savedState**
3. Use the following **commands** :
   - defaults delete "com.allegorithmic.Substance Painter"
   - defaults delete "com.allegorithmic.substance-painter"
   - defaults delete "com.allegorithmic.substance-painter 2"
   - defaults delete "com.allegorithmic.Substance Painter 2"

The error message "**Domain (com.allegorithmic.substance-painter) not found**" may appear, this is because the property file doesn't exist.

Linux

On **Linux** the preferences are located in the user application preference config file, stored in the home directory.

1. Navigate to **/home/*username*/.config/Allegorithmic** (Note that **.config** is an hidden folder)
2. Remove the file "**Substance Painter.config**"

Automated Installation

We are using **InnoSetup** to generate the installer of Substance Painter.
The whole set of parameters that can be used with the installer is available here: http://www.jrsoftware.org/ishelp/index.php?topic=setupcmdline

Installing in silent mode (via command line)

The flag to use to perform a silent install is "**/SILENT**". You can also use the "**/NCRC**" flag to skip the CRC (verification) of the package.

Example :

```
SubstancePainter_Installer.exe /NCRC /SILENT /DIR="C:\Installation\Folder\"
```

> The installation path must be using single backslash character to separate folders, otherwise the InnoSetup installer will not recognize the path.

Querying Current Software Version

Checking the current version of the application can be done in multiple manner depending fo the needs (without of without launching the software for example).

Checking Version via the executable

Substance Painter executable on Windows contains few informations that can be queried by external tools (such as Python).

Example in **Python 3** (taken from here) :

```python
import os
import imp
import pip
import win32api #pypiwin32


#---------------------------------------------
#Reader
#---------------------------------------------
def getFileProperties(fname):
        """
        Read all properties of the given file return them as a dictionary.
        """
        propNames = ('Comments', 'InternalName', 'ProductName',
                'CompanyName', 'LegalCopyright', 'ProductVersion',
                'FileDescription', 'LegalTrademarks', 'PrivateBuild',
                'FileVersion', 'OriginalFilename', 'SpecialBuild')

        props = {'FixedFileInfo': None, 'StringFileInfo': None,
    'FileVersion': None}

        try:
                # backslash as parm returns dictionary of numeric info
    corresponding to VS_FIXEDFILEINFO struc
                fixedInfo = win32api.GetFileVersionInfo(fname, '\\')
                props['FixedFileInfo'] = fixedInfo
                props['FileVersion'] = "%d.%d.%d.%d" % (fixedInfo
    ['FileVersionMS'] / 65536,
                        fixedInfo['FileVersionMS'] % 65536, fixedInfo
    ['FileVersionLS'] / 65536,
                        fixedInfo['FileVersionLS'] % 65536)

                # \VarFileInfo\Translation returns list of available
```

```
            (language, codepage)
                    # pairs that can be used to retreive string info. We are
using only the first pair.
                    lang, codepage = win32api.GetFileVersionInfo(fname,
'\\VarFileInfo\\Translation')[0]

                    # any other must be of the form \StringfileInfo\%04X%
04X\parm_name, middle
                    # two are language/codepage pair returned from above

                    strInfo = {}
                    for propName in propNames:
                            strInfoPath = u'\\StringFileInfo\\%04X%04X\\%s' %
(lang, codepage, propName)
                            ## print str_info
                            strInfo[propName] = win32api.GetFileVersionInfo
(fname, strInfoPath)

                    props['StringFileInfo'] = strInfo
        except:
                    pass

        return props



    #----------------------------------------------
    #Check exe
    #----------------------------------------------
    Path = "E:/Software/Painter/Substance Painter.exe"

    FileInfo = getFileProperties(Path)

    print( FileInfo )
```

Will output :

```
E:\Software\Painter>query.py
{'FixedFileInfo': {'Signature': -17890115, 'StrucVersion': 65536,
'FileVersionMS': 132251649, 'FileVersionLS': 65536, 'ProductVersionMS':
132251649, 'ProductVersionLS': 65536, 'FileFlagsMask': 0, 'FileFlags': 0,
'FileOS': 0, 'FileType': 1, 'FileSubtype': 0, 'FileDate': None},
'StringFileInfo': {'Comments': None, 'InternalName': 'Substance Painter',
'ProductName': 'Substance Painter', 'CompanyName': 'Allegorithmic',
'LegalCopyright': 'Copyright (C) 2017 Allegorithmic', 'ProductVersion':
'2018.1.1', 'FileDescription': 'Substance Painter 2018.1.1',
'LegalTrademarks': None, 'PrivateBuild': None, 'FileVersion': '2018.1.1',
'OriginalFilename': 'Substance Painter.exe', 'SpecialBuild': None},
'FileVersion': '2018.1.1.0'}
```

Checking Version via Command Line

You can use command line as following : **substance painter.exe** command_name *[option]*

To ask the version use **--version**, **-v**.

> Note that the command line actions of Substance Painter will output a window.

Checking Version via Scripting

The scripting API (available via the help menu) allow to query the current version of the application.

Take a look at the namespace "**alg**" for further details.

Example :

```
//Print current version in the log window (string)
alg.log.info( alg.version.painter );
```

Retrieving Installation Path

On Windows the installation path of Substance Painter can be found in the Registry by looking at the following key :

Computer\HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\Uninstall

Under this key will be listed the software installed on the computer with additional information.
Substance Painter and Substance Designer use a unique **AppId** to identify them :

- Substance Painter : {33C3E9E2-0675-4196-9019-28AB9C5E9BB0}
- Substance Designer : {25E7D16D-1FBA-49EA-BF36-E2D6B20A9206}

Each key contains our **Inno Setup** configuration and details.

Example :

- **DisplayName** = Allegorithmic Substance Painter 2018.1.1
- **DisplayVersion** = 2018.1.1
- **Inno Setup: App Path** = E:\Software\Painter_2018-1-1